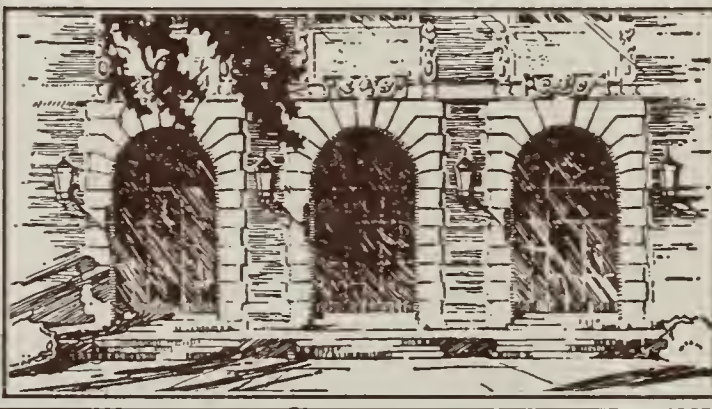


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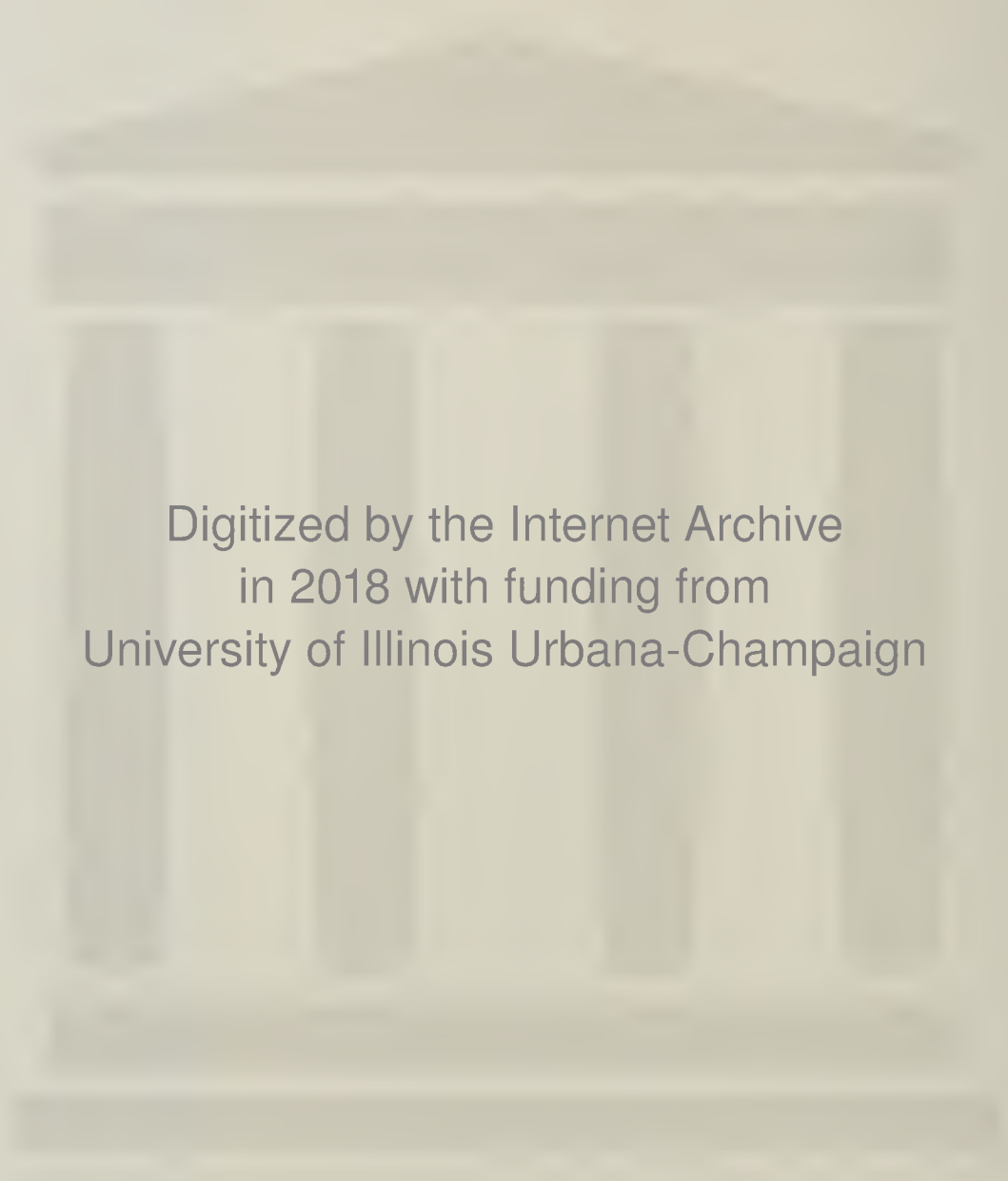
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NOTES ON ORGANIZATION AND TRAINING, BY A REGIMENTAL OFFICER.

By Colonel A. G. RAPER, late Commanding 2nd Battalion, North
Stafford Regiment.

QUESTIONS of organization and training are now so much before the military public, and are so vitally connected with the efficiency of our Army for its unique Colonial and Imperial duties, that perhaps a few simple remarks about them, from the view-point of an infantry regimental Officer, may not be out of place in a Service magazine.

But as without an assured flow of men, enlisted for such terms of service as will admit of our home and foreign garrisons being maintained at full strength on the voluntary system, neither subject can be effectively treated, it is not easy to avoid some prefatory observations on the initial difficulty which hampers the many capable organizers the Army now possesses, viz., the recruiting problem. There has, apparently, been confusion in some quarters between cause and effect, and Officers, when suggesting desirable reforms, are apt to magnify the particular reform they urge into the one thing needed, to secure a plentiful and regular supply of recruits.

Unquestionably, free groceries, improved messing and cooking, juster clothing regulations, and other kindred much needed changes must better the condition and increase the comfort of the soldier, thus raising the entire status of the Army, as every good Officer exerts himself to do; but it is only indirectly such improvements influence recruiting through Reservists and discharged men, and by gradually lessening the prejudice against soldiers, which, unhappily, still exists in many parts of the country. The direct causes which operate on the recruiting market lie deeper, and the proportionate strength of their separate roots can less easily be traced; they are never constant, but vary with the social, industrial, educational, wage-earning conditions of the country, and so are of wider scope than to be seriously affected by details of Army life, unless the profession, as a whole, by its present advantages, prospective inducements, or social prestige, rises superior in a marked degree to most

callings followed by the classes from which recruits are ordinarily drawn. Possibly loss of independence is one of the most powerful factors which tells against enlistment in the existing state of feeling among the working classes, and this is not met by small improvements in Army régime, however desirable these latter may be in themselves.

We must look to the nation to meet its own recruiting troubles. It is the country, through its representatives in Parliament, which authorizes the existence of the Army, appoints its numbers, decrees its maintenance by voluntary enlistment, and limits the terms of original enlistment; hence it is for the country, not for soldiers, to secure enough recruits to keep up the Army under the conditions it has imposed, and soldiers can no more be held responsible for any failure on these points than they can for any occasional sacrifice of Army efficiency to the requirements of party—that fruitful source of costly mismanagement in every State Department!

However much one might like to see the nation rise to a higher conception of patriotism, and substitute some form of personal service for the present monetary bargain on which the ranks of the Army are provided, it seems certain that the great body of electors are not yet roused to the pressing nature of the recruiting problem, that each Government, *more suo*, parleys with and minimizes its urgency, and that Parliament is indifferent, if not blind, to its national aspect, and to the preliminary reform needed to place Army administration on a sensible, workable footing. When this first necessary step of administering the Army under a sound, business-like system of single control¹ has been taken, responsible military experts will be called on to point out clearly the minimum requirements of the Army, as a fighting machine, so that the country may know its liabilities, exact an equivalent efficiency for its outlay, and be in a position to choose between more, or wiser, expenditure in money or men. Most soldiers would prefer the latter, and it is quite on the cards that either party in power would rather attempt to introduce a modified form of compulsion by applying the Ballot Act than ask assent to any large addition to the Budget. The former would be the logical outcome of territorialism, though, owing to the tendency of the country labourers to gravitate towards large towns, considerable re-adjustment of districts, on the basis of a numerical unit of the male population, would, under ballot pressure, be necessary.

Belief that some such solution of the recruiting question may soon come within the range of practical politics has led to the suggestion that, for supplying the ranks of the Army, and keeping them stiffened with seasoned soldiers, as well as for maintaining and training an efficient Reserve, the Militia seems the readiest available, if not the best, basis to work upon; and without going over oft-trodden

¹ The above words were penned months before recent correspondence on the subject appeared in the "Times;" indeed the bulk of this paper, except a few sentences inserted in re-copying for the R.U.S.I. Journal, dates from last May.—A. G. R.

ground, the following outlines for so utilizing the old constitutional force of the country are humbly indicated:—

(1.) Maintain the Militia at a high fixed establishment (if necessary by ballot): allow and encourage men, as now, to enlist from it for the Line; but after colour service make all Reservists complete their term of engagement in the Militia, and assemble for annual training, when they should receive pay and 1*l.* bounty at the end of the training. At other times, Reservists to receive no pay. These Reservists to be supernumerary to the fixed Militia establishments.

(2.) Enlist as now, for 12 years: 7 with colours, 5 in Reserve (Militia). At any time after 5 years' service, men of good character to be eligible to extend to 12, or re-engage to complete 15 years with colours, receiving extra pay of 2*d.* or 3*d.* per diem during such extended or re-engaged service. After 15 years' service, to be allowed, if physically fit, to complete 21 years for pension, either with colours or in Militia—in the former case, the pension to be somewhat higher.

(3.) Men under 40 who have completed their original engagement to be retained (voluntarily) in a 1st Class Reserve, receiving 6*d.* per diem pay: to be called up biennially for 14 days' training (portion of which to be devoted to ball firing), when they should receive 1*s.* 6*d.* extra daily, and a 2*l.* bounty at the end of it. A 2nd Class Militia Reserve to be maintained as now from Militiamen only and on same terms, but neither class should be reckoned as forming part of the effective fixed Militia establishment.

(4.) Every colour service man of good character, after 12 years' service (with colours and Reserve combined), to have a preferential right to employment in Government departments and offices. This is very important, in order to attract good men to the colours, and to raise the whole status of the Army in the estimation of civilians.

(5.) Permit men who have quitted colours to return at any time, if eligible, to complete term with colours, losing time absent for term service, but reckoning it for pension if they subsequently re-engage.

(It would probably be desirable to let men in special cases go to Reserve after 5 years with colours, or re-engaged men at any time during their re-engaged service; but in either case a sum of money on a graduated scale should be required of them for changing their conditions of service. This suggestion is unimportant, and is only made with a view of making conditions of service as elastic as possible to suit all cases.)

(6.) Abolish deferred pay, which has long been condemned by the entire sense of the Army, and in lieu issue a free grocery ration.

With the admirably improved system of cooking now being worked out at Aldershot, 2*d.* per diem would almost suffice for this, if a few improvements were made in out-station cook-houses.

(7.) Return to sensible clothing regulations—allowing men to retain time-expired articles—and give a really smart dress for walking out and full dress, which men can take pride in wearing before their friends and the public. Introduce a sensible, serviceable, working

dress for ordinary drills and parades, no matter what colour, though khaki serge would be best and available for foreign service. Recruits on joining should receive *new* clothing, and during their first twelve months' service an additional pair of boots.

This being a bare outline, other minor desirable improvements are omitted.

The large sum now paid, as a retaining fee, to 60,000 untrained Reservists at 6*d.* per diem, would suffice to keep 60,000 Reserve men in the Militia, with pay during training and 1*l.* bounty, in addition to 35,000 1st Class Reservists at 6*d.* per diem, with pay during fourteen days' training biennially and 2*l.* bounty, and leave a surplus of upwards of 20,000*l.* towards the free grocery ration, as a set-off against the number of men who would receive free groceries, but would never reach deferred pay under its present conditions of issue. If twenty-eight days' training, each year, would really prove as serious a hindrance to the employment of Reservists as is asserted in some quarters, fourteen days might suffice, and in special cases arrangements be made for men to be trained at times least inconvenient to employers, in military stations near their work.

These proposals might appear at first sight to weaken or injure the Reserve by retaining more men with the colours, but it may be doubted if they would do so in reality, as many existing Reservists, at the age of thirty, and at the conclusion of their twelve years' engagement, would probably consent to join the proposed 1st Class paid Reserve, and so more than equal the numbers retained with the colours; while the gain to the Regular Army of more seasoned soldiers in the ranks and fewer men required to pass to and from India and the Colonies would be enormous; and in point of cost the money saved on the latter head would probably far exceed the increased expenditure on the proposed re-engaged pay, and allow a margin to aid the small increase suggested on clothing.

Considerations of cost must naturally influence and limit any proposals designed for practical adoption, and it may be observed that the above involve neither outlay nor enlarged annual expenditure, are equally feasible with or without ballot pressure, and are capable of immediate introduction without prejudice to the strength of the existing Reserve, or Militia Reserve. These ideas, with others of a similar tenor, were roughly sketched last June before Lord Wantage's Committee in explanation of the writer's evidence, but as the Committee would have the advantage of hearing many proposals from abler and more experienced Officers, and could not possibly publish *in extenso* all the schemes they received, or incorporate in their Appendix half the suggestions made to them, one of the members advised my offering them to a Service publication. There would seem, therefore, to be no breach of etiquette in having repeated here such portion of the same ideas as are necessary to explain the remarks which follow on the subject of:—

Organization.—These proceed on the assumptions (1) that a method has been found to secure enough Recruits to keep the Regular Army

up to a given, carefully estimated, establishment (say roughly, 210,000 men, exclusive of Officers) and to provide for a reliable, regularly trained, and easily mobilized Reserve; (2) that the distribution of the Army has, on political and military grounds, been decided to be much as at present, viz., about half in India and the Colonies, and half at home; (3) that the reinforcement in war of the foreign garrisons, including India, has been recognized as the duty of the home establishment. It would then become essentially the business of the military administration to organize the Army into cadres of such number and strength as will keep the home and foreign garrisons efficient, arrange for the regular relief of the same, and provide a thoroughly trained complete force ready for immediate field service and instant offence whether in reinforcement abroad, or in repelling attacks at home. Thorough organization in every detail during peace-time is the foundation of success in war; without it victory is heavily discounted, defeat liberally subsidized; this is an accepted truism, and it is superfluous to adduce in illustration the outbreak of the 1870 War—recently so powerfully attested by the evidence of Germany's chief organizer. Our existing units of organization—companies, batteries, battalions, &c., seem well suited to national characteristics as well as to colonial and field requirements. Companies can now be varied in strength from 50 to 150; i.e., a battalion from 400 to 1,200 bayonets, and the advocates of large companies (250 strong) do not appear to have made out even a fairly good case, either on administrative or tactical grounds, for a change which would upset the proportions of Officers in each rank, cause further unrest in the commissioned grades, and revolutionize our whole regimental system. We cannot do better than hold to our battalion and company units and encourage that regimental "*morale*" which is the one link in our military chain that has never yet failed, however sorely tried, and never will so long as soldierly instincts and *esprit de corps* of the true stamp are allowed to remain the back-bone of the Army. Our much abused regimental Officers, non-commissioned officers, and men are ready and willing to work hard, and are quite able to attain any standard of military efficiency required of them; probably, too, those most keen as sportsmen will make the best Officers in the field, for these are the very men whose energies, properly directed, will combine professional study with its most practical application in war.

Regarding the strength of the force to be kept in readiness for immediate action, we have no occasion to vie in numbers with Continental nations whose frontiers are contiguous to probable foes, nor need we contemplate having to place more than a small contingent in the field against any great Power on the Continent of Europe, and, without entering on any technical niceties about first and second lines, it is sufficient for my purpose to state, as is indisputably the fact, that our seaboard and Navy form our main defence, though the latter may, perhaps, not be nearly as strong as a prudential insurance of our commerce, food supply, and raw material imperatively demands. But it is admitted by all military writers that passive defence, without

the means of a vigorous offensive, is ineffective and is not war—also that for powers of offence in action, the Navy is limited to the range of its guns. So long, therefore, as we aspire to remain an Imperial Power, we ought to have, at the lowest computation—and it is a modest demand—one Army Corps always ready for instant offence, whether away from our shores or within them, for immediate and vigorous attack of any possible invader.

In order to meet the above demands, which we are not yet in a position to do—

1st. Keep in peace-time all corps detailed for the 1st Army Corps apart from, and not within two years of their turn for, the foreign roster, which, with upwards of seventy infantry battalions always at home, it should be easy to do; maintain them at war strength; concentrate them at certain fixed camps or stations in complete brigades (or divisions) under specially selected Staffs, who would accompany them on service; equip them fully in every detail (during the manœuvre season at any rate) as for war, and apportion them accessory departments for supply, transport, &c., with every other field service requirement, or at least sufficient to make them independent mobile brigades. The importance of thus uniting troops, both for organization and training, under the Staffs which would work with them in war can hardly be over-estimated, and is fully recognized both in France and Germany. Stations like Aldershot, the Curragh, Colchester, Shorncliffe, Portsmouth, Plymouth (with a camp for exercise formed on Dartmoor), Dublin, &c., may be indicated as almost ready-made for such brigades, at a cost little in excess of normal expenditure, if the money voted for barracks is judiciously laid out with a view to their accommodation. Where practicable, as at the first three above-named places, a proportion of cavalry and artillery should be attached, though it is desirable both the latter arms should be annually massed for “mass tactics” and manœuvre, if we can find enough men and horses of either arm for the word “mass” to be reasonably applied to. Naturally the battalions composing this army corps would change from time to time, in order to take their turn on the foreign roster, and similarly their Staffs would change in the usual way on the expiration of each Officer’s term of service, &c.

2nd. Keep battalions next for the foreign roster only at the strength required for the particular Colony or garrison they are destined for.

3rd. Other home battalions might be kept on a lower establishment to admit of the 1st Army Corps being completed to war strength; and if there is any difficulty under the present territorial system in keeping any battalions of the 1st Army Corps up to strength, an infusion of fresh blood from other districts would probably assist discipline, and tend to prevent cliques and other evils of over-localized enlistment.

4th. As regards supplying the foreign linked-battalions of 1st Army Corps with drafts (if the linked system is to continue) see below, under Training (c).

It may be well here briefly to touch on mobilization under the above plan, in order to compare it with the existing system.

To begin with : the 1st Army Corps is *ready* and *complete*, armed, clothed, equipped, drilled, staffed (if I may coin a word), and merely requires moving to the scene of action, or any particular brigade of it is prepared for one of our small wars as soon as naval transport is available : the Officers and non-commissioned officers have had a chance of working with and knowing their men : the Staff know the troops they have to fight with, and each corps and brigade possesses the cohesion, discipline, and power of moving and manœuvring necessary for a field force. There is no confusion, no waiting for, and bringing in of, Reservists piecemeal from every part of the country through their territorial districts ; then arming, clothing, equipping, and incorporating them into their proper companies at the risk of disorganizing those units at the critical moment of early collision with an enemy. Surely the experience of the volunteers (not Reservists) called for to complete and send out battalions after the Isandlana disaster was warning enough against such an unsystematic system ! Delay and confusion are inseparable from it at the outset ; indiscipline and disaster must be its fruit.

The 1st Army Corps, supposing the theatre of war to be abroad, having been instantly set in motion as proposed, other home battalions would be at once completed to war strength from the men still serving (in Militia) on their Line engagements. These Reservists should assemble at the headquarters of their Regimental Districts, whence the requisite arms, clothing, and equipment should be issued to them, so that they could be passed in a body, fully accoutred, to their respective battalions. Decentralization on a well thought out plan is desirable on this point, instead of the excessive centralization of the existing scheme. War equipment for these home battalions could be sent to corps direct from the nearest Ordnance Store Depôts, which should always possess sufficient stores to complete the particular corps serving at any given time within their assigned radius. The next to be called out would be the 1st, or paid, Class of Reservists, who could either remain at their territorial depôts or join home battalions, as required, in order to be available to fill gaps in the ranks of the Regular Army. Meanwhile, if occasion required, as many Militia battalions as might be necessary could be embodied, be drilling regularly, and be filling their ranks, either from the Militia Reserve, or by recruiting, or both, to replace men who might volunteer for active service with the colours. The Militia would thus help to make good casualties in the Regular battalions, and be available to garrison towns or fortresses at home or abroad, whither Government should be granted powers by Parliament to order them in case of national need. Regular battalions forming the 2nd Home Army Corps could be concentrated in the stations vacated by the 1st Army Corps, or elsewhere, under staffs pre-arranged at Army Headquarters as "in waiting," and merely requiring orders to proceed to their place of duty. The question of the Staff generally is a very important one in any scheme of organization or mobilization, but the

selection of Officers for Staff employ is a subject in itself far too large to enter on here, beyond remarking that the Staff for the 1st Army Corps should be specially selected for their aptitude for field work, while the Staff in waiting to relieve them should be men chosen for their experience in practical dealing with troops, and in the requirements of corps, and not mere theoretical soldiers, however able; indeed, in order to secure practical men on the Staff, it would be well that, in addition to the most stringent preliminary regimental selection, every Staff College student should be attached, as part of his college course, during two seasons, to the Staffs of Generals at Aldershot (or elsewhere) to be employed under them at the year's drills and manœuvres, and that, unless reported on favourably for practical ability and *savoir faire*, he should not be entitled to record P.S.C. after his name. They might, while employed as suggested, report confidentially, on the practical work they had taken part in, to the Commandant of the Staff College, and otherwise keep up a course of study. This is not intended to interfere with Officers being attached to other arms of the Service, though it might be combined with it. At present it is rare for any Officer who once enters the Staff College not also to pass out, because the curriculum is mainly theoretical, and a man who can read up enough to pass in is almost certain to be able to keep pace with the instruction when there, though his capacities may rather be suited to office than field work. Apology is offered for the above digression.

5th. In the event of attack at home, it is taken for granted plans exist for meeting an invasion at any probable landing-place along our coast line, together with schemes in detail for concentrating not only the 1st Army Corps, but other home battalions, as well as a proportion of the Militia and Volunteers, at given points for a vigorous assault on any enemy who had succeeded in landing, before he could get a strong foothold. By concentrating the 1st Army Corps in brigades, by grouping other home stations according to position, and by secret but thoroughly worked out schemes with the main railway companies, this should not be difficult, and a pre-arranged *ordre de bataille* for two Army Corps to assemble rapidly at any point likely to be threatened is an essential preliminary to any plan of action in the field which the circumstances of the moment might dictate, just as Von Moltke says the German advance to the frontier only was "pre-ordained in every detail."

6th. *Militia*.—By the system here outlined, the Militia is prominently brought forward as the true Reserve of the home Army, and it may be objected that recruiting from Militia to the Line would be robbing Peter to pay Paul; but if the Militia establishment be kept up, *exclusive of the three classes of Reserve men*, viz.: (a) men still on Line engagements, (b) paid Reservists who have completed their twelve years' original engagement, and (c) Militia Reserve men, the strength of the objection is reduced so as barely to hold, while the close welding of Militia with Line battalions would give a great impetus to the former force, and necessitate greater attention being paid to its real efficiency. For this purpose good Officers must be

secured, and their capacity thoroughly tested. It is probable that, owing to social changes of the period, gentlemen of influence in counties, or large employers of labour, who are willing to devote their energies to upholding their county Militia battalions, will be a decreasing quantity in the future, and, though it is most desirable to secure as many Officers as possible of these classes, some infusion of thoroughly professional Officers will become a necessity, and surely Government could find means without extra expenditure to utilize the services of the many retired Army Officers who now throng the country in Militia work. It is the fear of expenses connected with Militia training and messes which deters many valuable men from serving in Militia corps.

7th. *The Volunteers*.—With regard to the Volunteers, admirable as their spirit is, and valuable as their support has been in its moral weight with foreign nations, in saving the country millions of money, and in warding off conscription—so partially wiping out the reproach that we are a nation of shopkeepers—great, too, as is the efficiency many corps attain, with few opportunities for drill, it must be admitted they are not, by their constitution, adapted for prolonged field operations away from their homes. Their rôle and place in our organization would therefore, as a rule, seem to be to act chiefly in their own counties, to know every yard of the surrounding country, so as to be ready to guard communications, &c., to maintain order, to hold particular posts. At the same time, they should be prepared to take their place, side by side with the Regulars, in home army corps for defence at a distance from their homes; they should be brigaded annually for manœuvre (with Regulars, if possible), under a competent Staff, and be encouraged by Government in every possible way. The standard of their shooting as a body should be raised; their fire discipline should be improved; their place on mobilization should be assigned in the Headquarter scheme, and, to assist this, they should be carefully inspected and fully reported on, so that the Headquarter Staff may know the really reliable corps and those which they could best move to any given rendezvous in case of invasion; their services would then be invaluable, especially if assisted, as Sir C. Dilke recommends, by a well-trained mobile artillery, and if their place in the different schemes for meeting invasion from various points were so arranged (secretly, by Headquarter Staff) that at their annual gatherings they could be exercised on the lines of the duties they would probably have to undertake. Government, if authorized by the sitting Parliament, should have the power of calling them out at any time for the preservation of order. With the possibility of our food supply or raw material being cut short, and thousands of operatives suddenly thrown out of work, perhaps wanting bread, at a time when some naval reverse might induce an invasion panic, this latter duty for the Volunteers might prove most important, and save the nation from a vast calamity.

Not long since the Adjutant of an administrative battalion assured me that, on receipt of telegraphic orders, his battalion could assemble and be railed to Aldershot—a five hours' run—within twelve hours,

which he truly observed was more than any Regular battalion which had to be made up of Reservists could possibly do. This is merely quoted to illustrate what (allowing for pardonable exaggeration, and for a longer time to assemble scattered corps) in a national emergency, with the railway staffs working under Government, and assisted by military Staff Officers, could be done in the way of concentration of certain selected Volunteer corps, provided only good pre-arranged schemes are worked out in the Headquarter bureau secretly.

A French writer truly observes, "In the *ensemble* of the military machine, everyone ought clearly to know his proper place, his special duty, his manner and share of action." It is the province of organization to assign each his proper place, and his special duty; while to fit each to fill his place and do his duty in it belongs to training.

Training.—It requires no quotation from foreign authorities to convince any sensible man that training and discipline are more than ever essential to the efficiency of armies under modern conditions, and that our Army, small as it is for its world-wide duties, should at all times be maintained in the highest possible state of training. On this point, Captain Benson, R.A., in his recent prize essay (under "*Conclusion*," in the part on "Higher Tactics"), makes some terse and most apt remarks, which are worth pondering over.¹

To compare our system of training with that of foreign Powers is difficult, for three main reasons:—

1st. That we have not the men to train.

Speaking of the Prussian system prior to 1870, Boguslawski says it "provides a number of cadres of Officers and non-commissioned officers, in which are incorporated the young soldiers of from two to three years' service, of whom a fixed number are always present. *The strength of the cadres thus renders it possible to carry on instruction of all kinds throughout the year.*" (The italics are mine.) This is not so with us.

2nd. In very few of our home stations have we the ground requisite for practical field training and manœuvre of even small bodies of men.

3rd. Ours is both a foreign service and so far a standing Army, that men serve for longer periods than they do on the Continent.

This last reason may sound a paradoxical one to give as a hindrance to training, but, in a sense, it is a true one, and contains grounds more cogent than are often admitted for distinguishing between systems of training. Man—even soldier man—is a sentient animal, not an insensate machine, and the human element is a potent factor to reckon with, either for peace training or in actual battle. That a soldier who has to live several years of his life, as such, under continuous disciplinary restraints, always performing routine duties, and liable to be ordered to any part of the world at any moment, can stand the high pressure instruction which bodies of men assembled for short periods, like our Militia or Volunteers can, or even men under training for two or three years, with a view to complete military fitness before returning to civil life, is simply not in the nature of man.

¹ *Vide* "Journal," No. 158, p. 454.

Moreover, to the majority of soldiers, the Army is unlike a trade or profession, in that it lacks the motive power for a man to make his whole livelihood by it; but it is, instead, a constant, and often monotonous, training for an eventuality which *may* never come, viz., a campaign and fighting in earnest.

Now as regards want of men, the complaint of Commanding Officers of home battalions (especially in garrison towns) is that they can never get their men. Between recruits, companies detached for musketry and military training, gymnastic squads, working parties, garrison orderlies, garrison guards, garrison fatigues, mounted infantry, signalling classes, telegraphists, fieldwork classes, *et hoc genus omne*, not to mention men in hospital and employed on necessary regimental duties, a Commanding Officer seldom sees his battalion on parade except once a year, for General Officer Commanding's inspection, when all are expected to be perfectly trained in the most recent methods of everything; indeed the Commanding Officer often appears to be about the last man who has a lien on his men, and is driven to all sorts of shifts to catch the men to teach them necessary changes in elementary drill. Also company Officers (who cannot see too much of their men) are seldom able to get hold of them, and indoor instruction, which might be made such a valuable vehicle of training to all—for nobody can teach others clearly without first teaching himself well—is very rarely possible. This ought not so to be; but, while it remains the case, neither the high individual training under the fathers of the company, nor the subordination of massed individual units to one controlling will, nor lessons in delegation of responsibility by giving subordinates an entirely free hand—all so necessary for the higher tactics of the day—can be practicable. For the 1st Army Corps this evil would be lessened by strength and concentration.

Confined ground in our thickly populated and closely cultivated land is a real difficulty, but here, too, a partial remedy might be found.

The monotony of a soldier's life may also be varied, and the following small remedies are suggested. For the first evil:—

(a.) Rigidly cut down garrison permanently employed men. Orderlies are often simply servants to staff and departmental clerks—sometimes to Officers.

For all necessary station (and some regimental) duties attach to each home battalion a limited number of pensioners, supernumerary to effective establishments of corps, care being taken that they are never employed for any work in which a battalion should be self-supporting, either in the field or quarters, *e.g.*, cooks, signallers, tailors, shoemakers, &c. Such pensioners (or, if necessary, paid Reservists) to draw either their pension or soldier's pay and good-conduct pay, whichever is highest, be treated for allowances, &c., just like soldiers—only non-combatant and not armed.

Where practicable connect all garrison and corps offices by telephones, and make orderlies use cycles.

(b.) Reduce to a necessary minimum all garrison guards and duties: this is already done in most garrisons. Abolish all depart-

mental working parties (during drill season at any rate), and employ unskilled civilian labour, which would be quite as cheap in the long run.

(c.) Cease to make the home battalion the feeder of the foreign battalion, but supply the latter with drafts direct from its own depôt, increasing foreign, decreasing home, depôts for the purpose; or, if the depôt accommodation does not permit of this, *attach* men of foreign battalion to the home battalion, as was at one time done with depôts in their transition stage. The present plan ruins the efficiency of home battalions as regards numbers, physique, and training, and turns them into mere drill-squads for the foreign battalion; by employing the home battalion as a second foreign depôt it degrades the duties of both, and breaks the hearts of Officers; it interrupts the relations of Officers and non-commissioned officers with their men, so weakens discipline, strains *esprit de corps*, and destroys the best elements of regimental *morale*, just when young soldiers are most susceptible to its moulding influence; and all this quite needlessly, since the depot exists, and should be something more than a receiving room for recruits. It is always well to have men trained by their own battalion Officers and non-commissioned officers. These should have a fairly free hand, and manage their discipline, interior economy, and drill on the exact lines of their own battalion system, subject to the general supervision of the Officer Commanding the Regimental District, or home battalion if attached. Here more delegation of power to Officers Commanding depôts is desirable.

(d.) Gymnastic (and other similar) instruction should be arranged for *drilled* soldiers in the afternoons only. Gymnastics form an important and integral part of every soldier's training, and should always be kept up as enjoined by regulation. Assaults of arms (station and battalion) might be encouraged, and the sporting instincts of the soldier enlisted to excel in feats of arms, as well as in athletics, football, cricket, &c.

(e.) The system of company military training being excellent, but too long (especially as on all wet days throughout the year company Officers should lecture to, catechise, and instruct their men in campaigning duties), reduce it to a fortnight, and extend the system to *battalion* training, *i.e.*, where practicable strike a whole battalion off duty for a month, so as to give Commanding Officers a real opportunity of instructing their battalions in drill, manœuvre, and battle formations. Steady drill should not be slighted: it is an important element in discipline, and on service men easily become loose without being encouraged in loose habits during peace; our discipline is not so rigid as that of the Germans—hence our need of inculcating *habits* of discipline in field evolutions. At the same time, the training required to make each man an intelligent fighting unit, and to mould these units into well-controlled groups (great or small) for battle action, takes much longer than it does to make battalions move steadily at evolutions—indeed, the former is the true groundwork of the latter. A battalion Commanding Officer should have the chance

of perfecting his men in both. From the 1st March to 31st October, there would be time to train eight companies for a fortnight each under their Captains, the battalion for a month under its Commanding Officer, and to reserve a month for brigade drills or manœuvres, as well as to complete the musketry course—especially if at least two companies at a time could be struck off duty for military training, in addition to one company at musketry.

(f.) Make inspection of field duties a reality. Regiments will always take pride in working up to inspection level, whatever the standard may be, and the standard should aim at delegated responsibility and a ready initiative by subordinates, suited to any given circumstances. The General Officers Commanding of our large districts have so much work thrown upon them they can seldom spare time for thoroughly testing field knowledge. Much of the interior economy part of inspection could be made from the experience General Officers Commanding and their Staffs gain of corps throughout the year, and not occupy more than a day or so at inspection time, but to estimate the results of the Captains, and Commanding Officers, instruction in outdoor training requires time and patience.

Whether any recognized form of attack is to be retained or not, the mere precise execution of any normal system is not sufficient test of the capacity of Officers or the training of men in field duties. Perhaps one may be excused speaking of a senior's duty from the subordinate's view-point, and saying that an Inspecting Officer should pre-suppose conditions where a recognized form would be difficult if not impracticable; and, similarly, should select positions and outline ideas for outpost duty, &c., &c., but great clearness on the part of an Inspecting Officer is requisite to explain what he means, as well as great patience in estimating how far ideas have been carried out from the subordinate's grasp of the situation.

Who has not seen Officers, slow to take in an *imaginary* condition, who were most practical men of quick judgment, ready resource, and rapid decision, if they saw troops before them? Again, an Inspecting Officer can hardly help having his own preconceived idea of the situation, which may not be grasped by, or be that of, the subordinate, who yet from the grasp he does get of it could give such a sound explanation of his object, plans, and method as would satisfy the superior he was an intelligent, practical Officer.

(g.) Lectures to Officers and non-commissioned officers, by Artillery Officers, on artillery fire, &c., in its various forms, would be both helpful and interesting if a few could be given in most garrisons from time to time. It is very necessary to impress on all Officers that complete unison between the two arms is absolutely essential for success in future wars, also to teach Officers of the other arms the effects of shrapnel fire, and how it influences tactics, so arousing discussion and thought on these matters.

(h.) In the four winter and furlough months (*home* training is exclusively spoken of throughout as in India, &c., battalions can manage their training work much more effectively), the present customs seem suitable. Marches of different kinds can be practised,

combined with outpost duty and night 'signalling; minor war-games for Officers; battalion indoor classes for non-commissioned officers; reconnaissance schemes for Officers and non-commissioned officers; gymnastics for men—though these are desirable as much as possible throughout the year. Still, if real hard work is carried on through eight months, training in the four "dead" months should not be overdone, and the reins of the coach generally might with advantage be loosened.

As regards the second difficulty:—

(a.) If possible encamp out every battalion annually for manœuvre, concentrating battalions where practicable in brigades, to work with and against each other. Even where battalions cannot, on the score of expense, join a camp, much might be done by a long day's work during September, when the hay and corn is chiefly down, by working out schemes, though in close country, against a skeleton enemy. If rightly approached the farmers will usually allow men over fields not in crop, provided they don't injure fences. It is always important, when feasible, to have an enemy, as it gives reality to outpost and other work, enlists *amour-propre* not to be "bested," and is certain to lead to arguments among all ranks, which promote thought and inquiry.

(b.) Field firing ground is a crying need for proper inculcation of fire discipline, and accurate group shooting under company and section leaders, as well as for effective battalion working under circumstances approximating reality as much as may be. The authorities are fully alive to the importance of spending money to procure suitable ground for the purpose within a reasonable distance of each large military centre. Cool, steady, well-directed shooting of different kinds is an essential for battle training—not attainable by volleys of blank.

It is probably due to praiseworthy anxiety for progress that recent musketry courses have a tendency to try and make men run before they can walk. Many men, who are very shaky at hitting anything at short distances in individual practice, are pushed on to difficult field practices. Until a man feels he is tolerably certain of hitting a 6-foot square target every shot at 500 yards, he has no confidence in himself or his rifle, and is not able to profit by higher field practices. In this connection it is hard to refrain from observing that, for field shooting, our pouches are quite unsuitable and useless, whether for expense purposes or for the lying position.

On the third point:—(a.) It is held by many that three hours' instruction, as an average, daily, on purely military subjects (except during courses or manœuvres) is as much as soldiers can digest with advantage, and this could, as a rule, be given in the mornings and forenoons before the men's dinners. For afternoon work, when men are not at special courses, schools for technical instruction in trades, with competent paid instructors, might be established in most stations, and the men obliged to attend, so that soldiers could learn not to be idle during their time with the colours: they could not, of course, in most cases acquire an artizan's skill, but

they might at least learn to be "handy" men, who would be in a better position to obtain employment on return to civil life. Compare soldiers with sailors, and it will be found that, while the latter learn to be both handy and industrious, the former, as a rule, are helpless and averse to steady, regular work. The existing rules about artificers, workshops, pioneers, &c., are usually inoperative for several reasons, chiefly for want of men to teach, of instructors able to teach, and of shops to work in. It is here supposed that home battalions will have more trained men, fewer recruits, and less fiddling routine duties under these ideas.

(b.) Form schools, or squads of boys at the depôts of each territorial regiment; educate, drill, and instruct them in trades most likely to benefit battalions, viz., as tailors, shoemakers, carpenters, &c., also in signalling and telegraphy: or the existing schools at Chelsea and Dublin might be enlarged for the purpose, and certain boys retained there longer—from 14 to 17 or 18. By this means, hundreds of sons of deserving non-commissioned officers might be secured for the Service, and trained to supply a need much felt in every corps, of men instructed in trades, signalling, &c., as well as capable of becoming good clerks and non-commissioned officers.

A system on the lines indicated in these later proposals would mean outlay, but if the result promotes recruiting, if, by inculcating habits of industry and self-control, the Army is made a training school for civil work, so breaking down the lingering prejudice against soldiers, and identifying the Army more closely with the nation, would not expenditure be justified?

Well-trained soldiers make an efficient Army; soldiers taught to be industrious make a contented Army; well-fed and well-cared-for soldiers mean a sober, healthy Army, and each would more than compensate the cost of its creation, because the united whole would form a popular, and therefore a cheap, Army.

It remains to apologize for these crude jottings, so little worthy of record, but, when subjects are under discussion, the simplest ideas sometimes supplement abler contributions. While serving, it is an Officer's duty to make the most of the material given him without question, though, when forced to stand aside from active work, he may perhaps be pardoned for seeking to further, and keep touch with, practical soldiering.

NOTES ON THE ATTEMPTED INVASIONS OF IRELAND BY THE FRENCH IN 1796-98.

By Rear-Admiral P. H. COLOMB.

I. *The Attempt of Hoche.*

A CORRESPONDENCE recently took place in the "Times," which was raised by a letter from Hon. R. B. Brett, on the liability of Ireland to invasion by the French. Mr. Brett sounded a note of alarm, which, if acted on, would materially influence our military policy, and not improbably require a considerable expenditure of money. He based his alarm on the attempts of France in 1796-98, urging that Hoche's expedition nearly succeeded, and that, had it done so, the least result to follow would have been much distress and misery. He then argued that at the present day, a powerful British fleet was much more impotent to ward off such attacks than it was in Hoche's time; and that in fact the successful invasion of Ireland was now so much more open to the French than it used to be, that we should be highly blamable if we did not look the question in the face and prepare specially to meet an invading force on the soil of the Green Island.

I answered, as fully as the "Times'" space admitted; but, as I have observed that there is a great deal of misapprehension current on the subject of these attempted invasions of Ireland, and the lessons they may have to teach us, I have thought I might as well use the vehicle of our Journal for the purpose of explaining more completely the views which I think we should hold on this subject.

Undoubtedly Mr. Brett was right in appealing to the historical record as the proper guide of our steps now. This opinion has of late years become nearly absolute in the Navy, and it is well pointed out that, even were the historical record worse than it is, we should still be bound to it as our only basis to start from. No doubt in cases it may be found that circumstances have so widely changed that the historical record ceases to be of any avail. But every such case ought to be taken on its merits. We cannot say, until we have examined the matter, how much circumstances really have changed, what causes remain, and what have disappeared. But our point should be first to note the effects which we find in the historical record, and then to endeavour to establish accurately the causes to which those effects were due. After this it is a comparatively easy task to ascertain which of these causes still remain, and what new factors have been added. Then it is not an insoluble problem to show what effects would now follow if all the remaining causes were put into operation.

Mr. Brett and others do not seem to me to have been quite as accurate as they might be in setting forth the effects of the French attempts on Ireland; and to have been still more lax in collecting and analysing the causes. I do not mean to say that any one has fully carried out these duties; I doubt whether materials to do so are easily come-atable. But I think that by looking at these invasions of Ireland as a whole, in their broad lights, and in their side and cross lights, we can gather up a tolerable knowledge of the state of the case nearly a century ago, and can come to some fairly reliable conclusions as to what the state of the case would now be, should France find herself at war with us.

The attempts with which we have to deal are five in number:—

(1.) Hoche's expedition, which sailed from Brest on the 16th December, 1796, but did not effect a landing.

(2.) General Humbert's descent with a small force in Killala Bay on the 22nd of August, 1798.

(3.) The descent of Napper Tandy on Rutland Island about the 16th of September, 1798.

(4.) Bompard's expedition, which sailed from Brest on the 16th of September, 1798, and was destroyed by Sir John Warren on the 12th of October.

(5.) A second attempt to land troops at Killala Bay about the 27th of October, 1798.

The task which lies before us is to set out the circumstances which appeared to the French to justify these several attempts; and how far such circumstances still exist. Next to look into the causes of the several failures, and so to compare them with the circumstances of the present day as to give us an idea of whether they are still operative, and if so, whether they have been strengthened or weakened by the lapse of time and the course of change.

At the outset, I think it must certainly be said that, whether the information before the French at the close of last century did, or did not, justify the successive attempts, the results were not such as to encourage their continuation; and reflective Frenchmen of the present day cannot derive direct encouragement from the history to organize similar attempts if war arose between us again.

Primâ facie, the whole of the expeditions were a dead loss in money and prestige to France. Our older naval historians were much given to reviewing the results of operations on either side in the form of a debtor and creditor account; and according to how it stood, so they apportioned praise and blame. It would not have been easy for them to have set out anything on the credit side of the French account in these transactions, and they would have been unsparing in their blame.

It is not unimportant to note that, of all five expeditions, the only one which was not a disastrous failure was the smallest. Napper Tandy, in a brig, landed his forty-five men on Rutland Island, a small patch within the Isle of Arran, took military possession of it, and re-embarked without interruption. This was the least of the failures.

The next in the descending scale was Humbert's landing. He actually made a success in occupying Killala, and a still more important one in defeating the British troops at Castlebar. But after that he was a mere wanderer on the face of the earth, flying hither and thither from troops which he dared not meet, until he surrendered unconditionally at Ballinamuck, near about the centre of Ireland, after having been on shore just seventeen days.

Hoche's great expedition, and the second attempt of Savary to land troops at Killala, may be bracketed in the list of failures; for each expedition reached unmolested the vicinity of its rendezvous, and each returned to France without having effected anything.

Bompard's failure was complete and terrible, and perhaps read the strongest lesson of all to the French Government in partly convincing it that the Republican enthusiasm was but a subjective emotion, and had no power except in that region.

Then I think that in the review, we have brought home to us by illustration, what ought to be already obvious, namely, that when it comes to invasion in the face of a superior navy, the best chance is in small expeditions. As what is to be done must be done by stealth, the smaller the expedition the less chance it has of being noticed. As the expedition grows in size, so does it attract attention, and unless physical difficulties intervene, so does it become more and more certain that the superior navy will hinder it.

The necessity for land defence as well as for naval defence rests on this consideration. A country possessing the command of the sea cannot expect an inviolate territory if its land defence is so reduced as to tempt a small expedition. The attempts upon Ireland teach us to maintain such defensive land forces as will make it hopeless for an enemy to attack unless in considerable strength. When brought to that point, the enemy, knowing the impossibility of attacking in great force by stealth, gives up the attempt altogether.

Now we must recollect that, but for the insurrectionary condition of Ireland, France could hardly have put forward any of these endeavours to land troops. France swarmed with Irish rebels—most of them vain coxcombs, with little sense of honour and very small wits—who played on French ignorance in representing a state of things in Ireland which really existed only in their own shallow and corrupt minds. So the French, still wild with the belief that they were political discoverers about to regenerate the world, accepted the wildest stories. A month before Hoche sailed, all the leading Frenchmen at Brest took in the story that the Irish had risen, seized the arsenals in Dublin, and driven the British troops out of Ireland.

The French held the general idea that they had but to show themselves and that all populations would rise and welcome them. Nothing would have persuaded them that whatever grinding the population of Ireland was suffering at the hands of Government, it was as nothing to the grinding of their own chosen rulers. And so they firmly believed that it was only necessary to drop French troops on the soil of Ireland, in small or in large bodies, to draw the whole of the immediate populations, rich and poor, to their standards. The

cruel awakening to the truth was only suffered by Humbert and his men, but it may be said that the primary cause of all the French failures was perfect ignorance of the state of Ireland.

I think it may be said that fear of the British fleet was the next governing cause of the failures. It was terribly realized by Bompard, and was over and over again nearly realized by different ships of the several squadrons. The direct interference of the British Navy was a main factor of Hoche's failure, and I think we cannot escape the conviction that the fear of being met by our ships weighed with immense effect for evil on his force before it sailed.

Other minor causes, no doubt, had their due places; but if we could remove these two main conditions, it does not seem that there was so much to hinder French success.

Hoche, in command of 100,000 men distributed along the northern coasts of France, seems early to have burned to do something over sea with them. He was soon surrounded by Irishmen who were ready to represent anything and to promise anything which might lead him to the attack of their native country. Amongst these were the celebrated Wolfe Tone; a Captain Duckett, whom Tone calls indifferently "a blackguard," "a rascally adventurer thrusting himself into our business," and "a scoundrel"; another man, named M'Sheehy, whom Tone dubs "a blockhead"; and a Colonel Shee, really in the French service, and who seems to have been the truest man amongst them.

Gradually the ultimate scheme developed itself; but from first to last it met with no support from the Navy. Hoche was always in the position of knowing better than the naval Officers, and of forcing them on. At first it was hoped to draw the Spanish Fleet to Brest, and to conduct the enterprise under guard of a naval force fit to contend on equal terms with any British fleet likely to assemble. But the Spaniards were soon given up—"Sempiternally damn them," as Tone says—and in the evasion of the English rested the sole hope of success. The sort of adviser they had in Tone may be gathered from a note in his diary of the 20th October. He had been told he was to have the rank of Adjutant-General, and then writes, "Huzza! huzza! I am to travel in General Develle's carriage, with Hoche's cousin, and Privat, his A.D.C." Such expressions of delight are vitifully childish when contrasted with the seriousness of the business that was in hand.

The French Minister of Marine, Truguet, was dead against Hoche's plans. Hoche, early in October, believed his troops would be on board in three weeks, but there was a difficulty in getting seamen. On the 18th, Colonel Shee told Wolfe Tone that he expected they would soon be off, that the General had no confidence in the Marine, but was determined, if they fell in with the English fleet, that fight they should; for, as the military would be at least two to one on board, he would give it out in general orders that the first man, Officer or seaman, of whatever rank, that offered to flinch, should be instantly shot on the quarter-deck.

Here we have a specimen of a man with the bit between his teeth. Probably when Villaret-Joyeuse ventured to point out to him that a

ship with three crews on board, and two of them sea-sick soldiers, was not in a condition for action, Hoche was only capable of registering it in his mind as one more illustration of the villainy of the Navy.

The naval forces being prepared at Brest consisted of 16 sail of the line, 14 frigates, 6 corvettes and smaller vessels, 6 lighters, and 20 transports. The flotilla was divided into three squadrons. Commanding them were Rear-Admirals Bouvet and Nielly. Vice-Admiral Villaret-Joyeuse at first commanded the naval force in chief, but still under the orders of Hoche. Disagreements between the General and the Admiral led to the removal of the latter, and Vice-Admiral Morard de Galle took his place.

The land forces to be embarked consisted of 14,110 infantry, 2,000 cavalry, but without horses, and 1,200 artillery—a total of 17,310 men, under Generals Humbert, Watrin, Gratien, Geney, Spital, Mermet, Harty, and Debelle. General Hoche commanded the whole, and Grouchy was afterwards either added or substituted as a subordinate General.

The embarkation began on November 17th, and on the 18th Tone records that:—"Villaret-Joyeuse, the Admiral, is cashiered, and we have got another in his place; Joyeuse was giving, underhand, all possible impediments to our expedition." From the authorities before me it is not quite certain whether it was originally intended that Richery's squadron should form part of the expedition. He had arrived at Rochefort on the 5th of November, with 5 sail of the line and 2 frigates; and as early as the 23rd of that month, Tone could not imagine what delayed the expedition unless it was the hope of Richery being able to join them.

The sort of man Hoche was is pretty well indicated by a note of Tone's on the 29th of November. He says that Hoche found time to spend two days and two nights away with "a little aristocrat" mistress. He had got rid of one Admiral who stood in his way; of his successor he wrote, "Poor Morard de Galle! he is already twenty years older; how I pity him!" Of the Navy generally, he said:—"What is the Navy? The problem is to discover. God forbid that I should have to do with it! What a miserable concern! A great body, of which the parts are disjointed and disunited; contradictions of all sorts; indiscipline organized in a military body. Add to this, proud ignorance and stupid vanity, and you will have the thing complete."

At this time the whole of the fine traditions of the French Navy were not lost; however much the withdrawal of the aristocratic system on which the French Navy had rested caused it to suffer, it is difficult, knowing all we do, not to believe that most of this was subjective in Hoche's mind, bred there chiefly by the opposition he met with in the Navy to his invasion schemes, and from his want of comprehension of the governing conditions of naval affairs.

About the 28th of November Tone met four or five of the naval Captains at Hoche's table, and he records them as believing that with the troops on board they would be a match for the English, but that the danger was in returning with only their own crews.

It seems impossible not to read between the lines here. No doubt French naval Officers had a greater belief in large crews than the English had, but unless we ranged ourselves beside Hoche in our notion of the French Navy, we can scarcely conceive any section of it taking the absurd view represented. The truth must rather be that at their master's table they were saying all they dared to say in disparagement of a scheme which they thought wild and impossible.

By the 4th of December the embarkation was to be completed by the placing of the Staff on board the "Indomptable." Tone himself was on board on that day, and orders were issued that no leave was to be given after the 5th.

And now it was that the realities of the situation began to dawn on those who had entered into the project with a light heart and not much understanding. Provisions were necessarily limited, and troops could not go on eating their heads off in harbour for an indefinite time. It behoved them to be off without delay. But, writes Tone, "As it is now pretty certain that the English are in force off Ushant to the number of 16 ships of the line and 10 frigates, it seems hardly possible we can make our own way to Ireland without falling in with them." On the 8th of December, Tone thought that Admiral Gardner was watching them with 18 sail of the line. The French, having 30 sail in all, of which Tone supposed only 15 were of the line, represented "a force which could never escape the vigilance of the English."

At this time, and for the three previous weeks, the weather had been remarkably fine and the wind fair for getting out of the harbour and for the voyage to Ireland. Colonel Shee told Tone that Hoche thought the Navy was trifling with him on purpose to gain time until the bad weather set in; when, if it held any time, as was highly probable, the stores of all sorts would be exhausted, and the business must be given up from sheer necessity. Bruix, the Captain of the Fleet, who was supposed to have been a supporter of Hoche's, had now cooled. There was a story going about that they were waiting for some charts or plans, but of course the real reason was the one Tone set down. It was impossible to move until the English got out of the way. Hoche might have ordered the fleet to sail, on his own responsibility, but he would not take that risk.

However 4 frigates went out of the Goulet on the 10th of December, and on the same day Richery arrived with 5 sail of the line and 2 frigates. As only one of Richery's ships afterwards accompanied the expedition, it should seem that, after all, his non-arrival could have had nothing to do with the delay.

On the 11th December Hoche embarked on board the frigate "Fraternité," where Morard de Galle also flew his flag. Then the fleet lay perfectly ready for sea, until 11 A.M. on the 15th, when the signal was made to "heave short." This signal had been made the day before also, but presumably annulled.

The important point to note here is the signal which was flying at the look-out station:—"Four enemies in the offing." That is to say there were no signs of Colpoys' fleet, and still reading between the

lines, we may readily understand that the French Admiral and General knew what had happened and were seizing the earliest possible opportunity to break the blockade.

For these enemies were Colpoys' frigates; his fleet of 15 sail of the line had been blown away, or were at a rendezvous 30 miles to the westward, which circumstance alone enabled Hoche to put to sea at all. But for this breeze of wind, which may equally account for the entry of Richery and the exit of Morard de Galle, it appears as if Hoche's troops must have ultimately disembarked again after consuming all their provisions, just as did those embarked in the Dutch fleet under De Winter in 1797.

On the 15th December, the weather was magnificent at Brest, and the wind fair out of port. The ships began to weigh at 1 P.M. and stood out of the Goulet into Camaret and Bertheaume Bay, where they anchored for the night. On the 16th, at 2.30 P.M., the "Indomptable," which was properly the flag-ship, weighed, and with the whole flotilla stood out before a fair light wind. There was of course no sign of the British fleet, or they would not have moved. Richery was the only Flag Officer who kept his flag in a line-of-battle ship. His flew on board the "Pégase," 78, while Bouvet hoisted his in the frigate "Immortalité," and Nielly his on board the frigate "Résolue."

The clear course out of Brest is about W.S.W. from the Goulet, and it leads between the two shoals, Basse Royale to the north and the Chaussée de la Vandrée to the south, the passage being about 3 miles wide. After passing through this channel the sea opens widely, and between Ushant Island to the north and the western extreme of the Chaussée de Sein to the south the distance is 22 miles. Now, as the fleet was sailing out before the easterly wind, which naturally increased in force as the ships drew away from the shore, what was to hinder it from keeping together and standing safely to sea through the wide channel immediately before it?

Nothing but the fear of the British fleet.

In spite of Hoche's talk, he must have become aware long before he sailed, that the one chance he had was to avoid being caught by Colpoys. Hence the orders to the ships of the fleet were to avoid the clear and open channel to the westward, and to seek the intricate and dangerous channel of the Raz de Sein to the southward.

Between the Chaussée de la Vandrée and the mainland, a distance of $6\frac{1}{2}$ miles, there is a line of a dozen or more dangerous shoals extending nearly east and west, and forming the southern arm which bounds the channel up to the Goulet. South of this there are several other shoals, and then open water for 9 miles till the entrance to the Raz de Sein is reached. No single ship, unless she was driven to it, would forsake the clear route W.S.W. to steer south through such a host of dangers. But for a fleet the passage of the Raz de Sein was still worse. Anyone studying the chart and realizing the circumstance that this mass of ships must make their traverse in at best dim moonlight, with a wind quite possibly growing light and scant as the narrow strait was approached, will recognize an act of madness

on the part of the Commanders of the French fleet, and Hoche must have suffered severe awakening when he was at last brought face to face with all those perils which the naval Officers were thoroughly alive to from the very first. It is certain that he did realize those dangers, for an attempt was made at 5 o'clock that evening to alter, by the clumsy apparatus which then represented the night signal, the written orders previously given.

The Raz de Sein is formed between the mainland at Point du Raz and the eastern end of the elongated group of rocks, islands, and shoals, extended 12 miles, and lying east and west, called the *Chaussée de Sein*, but well known to our seamen of those days as "The Saints." If there were no shoals to block it, the whole passage would be only $2\frac{1}{2}$ miles wide. But the approach to the narrowest part of the strait is blocked by a great shoal called the *Stevenec*, or *Tevennec*, which diminishes the width of the passage on the east side to $1\frac{1}{2}$ miles, and on the west side to little more than 1 mile. These channels were not marked by visible objects, and therefore could only be approached by those marks, bearings, and distances which are known to the use of seamen, but always indicate difficulty and danger which skill and coolness are required to avoid.

After passing through either of these channels, there was still a group of highly dangerous shoals to be avoided which, for heavy ships, divided the channel into three parts, the widest of which was only $1\frac{1}{2}$ miles across. Attempting to take a fleet through such passages by night would be hazardous, even if the ships were moved by steam. It was, as I have said, an act of madness for Morard de Galle, and its madness is more marked when we consider that with darkness coming on, the Admiral and the General, before they made their countermanding signal, were practically in the open sea, but were causing the fleet to quit it for the purpose of winding through a channel dangerous even in broad daylight.

But Hoche was between the devil, represented by the Raz de Sein, and the deep sea, represented by the four look-out ships which had been seen from the signal station the morning before. Even if they were right in their surmise, that Colpoys had been blown away, these four look-out ships, or some of them, would be sure to follow on their track and bring Colpoys down on them, perhaps in the middle of the landing, and when they were least capable of resistance or escape.

The result of the night signal was simply to break up the fleet before it was even clear of the land.

The confusion was heightened by the action of the only English frigate now on the spot, the "Indefatigable," Captain Sir Edward Pellew. He had sent his other ships away, one to England and two to Admiral Colpoys, whose rendezvous, be it remembered, was 24 miles west of Ushant. He now closed with the advancing French fleet as darkness fell, and by firing guns and rockets sought to further mislead the French fleet.

In the end, 6 sail of the line, 6 frigates, including the "Fraternité," a corvette, and a lugger followed the new route, while the rest

followed the old one through the Raz de Sein. In attempting the passage, the "Séduisante," 74, ran upon the Grand-Stevenec, and went to pieces there with great sacrifice of life. Tone, in the "Indomptable," writes on the 17th, that in passing through they had been within an ace of running on a sunken rock; and Captain Bedout, who commanded, and had himself been captured in the "Tigre" the year before, after receiving four wounds, said to Tone that he would rather stand three engagements than again pass through the Raz at night. "Ours," says Tone, "is the first squadron that has passed through the Raz, which even single ships avoid, unless in case of necessity."

When daylight came on the 17th, this part of the squadron only mustered 18 sail, instead of the 43 which was their proper muster. We have seen 15 only accounted for, so that there were still 10 sail which were missing.

However, Admiral Bouvet, in the "Immortalité" frigate, drew together the 8 sail of the line, the 7 frigates, and the single transport which remained to him, and continued to stand to the southward on the port tack. At 11 in the forenoon he wore and stood to the northward, persuaded that the Commander-in-Chief was at hand, and probably knowing nothing whatever of the real occurrences of the night.

Not finding the "Fraternité," Bouvet opened the sealed orders given to him in case of separation. These, he found, instructed him to rendezvous off the Mizzen Head, in Ireland, and to cruise there for five days.

Now we must note that the whole of this failure, from the beginning to the end of it, was due to simple fear of the English fleet. And it was not fear of a fleet present, but of a fleet absent, for though James declares that the French accounts put thirty sail of English in sight on the 15th, Tone specifically states that there were only four, and the movements of Pellew's frigates are unintelligible except by recognizing the very distant position of Colpoys.

The fear of the absent fleet still operated, after Bouvet had read his orders. The wind had by this time shifted to the S.W., and Mizzen Head must have borne about N.W. But fear of the English caused Bouvet to steer W.N.W., and he ran two days on that course before he dared to steer directly for his rendezvous.

We must recollect that this fear of the English, so operating, was the cause, first, of the separating and dispersal of the flotilla, and, secondly, of its non-concentration. Had Bouvet been free from this fear, he would naturally have closed Brest again for information, or at least would have steered straight for his rendezvous, under the knowledge that the separated parts of the fleet would do the like with an almost certainty of re-union at the rendezvous after the least possible delay, if not on the route. But the fact that Bouvet was ordered to steer for a place, and yet did not dare to do it for fear of being caught, makes him the sounder of a note of intelligence singularly melodious in the ear of a nation relying on transactions at sea for its defence.

Bouvet ran 5 or 6 knots an hour for the two days on this course, which was leading him nowhere if it did not lead him out of the English jaws. On the 18th December, at 9 o'clock in the morning, a dense fog set in, and continued all day. Tone made out that they had 6,500 troops with them with Grouchy as the senior General. On this day, Tone's Captain, Bedout, opened his sealed orders, and found that, in case of separation, he was to cruise for five days off Mizzen Head, then to go to the mouth of the Shannon and cruise for three days, and then, if he met there neither fleet nor orders, he was to return to Brest.

I think we cannot omit to notice that such orders could only have been dictated by fear of the English fleet. I take it that English naval Officers would be unable to conceive the possibility of undertaking an invading expedition where no more precise orders than these could be given, and when it could not be settled beforehand whether the landing was to be in Bantry Bay or in the Shannon.

On the 19th December, in the morning, it was a stark calm, and the ships were rolling in a heavy swell. "Damn it to hell for a calm, and in the middle of December," writes Tone in a rage. With a fair wind they could be at Bantry next day. But Tone does not point out that if it had not been for fear of the English fleet they might have been at Bantry at the time of his writing. The distance from Brest to Bantry Bay is only a couple of days' run at from 5 to 6 knots. The squadron was going at that rate with the wind only just free. It would have run 7 or 8 knots if it had borne up a couple of points and steered straight for the rendezvous.

Early in the forenoon signal was made for a fleet in sight, but no one could at first tell whether the ships seen would accompany them to the excitement of Bantry Bay or conduct them to the calmness of an English prison. At 10.30 A.M. they recognized their friends, and counted sixteen of them.

Rear-Admirals Nielly and Richery now joined Bouvet with the line-of-battle ships "*Révolution*," "*Fougueux*," "*Mucius*," "*Pluton*," "*Wattigny*," and "*Rédoubtable*"; and the frigate "*Bravoure*" and the brig "*Voltigeur*." In spite, therefore, of the half countermanded orders, the terrors of the Raz, and the two days' flight from an imaginary British fleet, the whole of the expedition, except the line-of-battle ship "*Nestor*" and the frigates "*Fraternité*," "*Cocarde*," and "*Romaine*," with the smaller vessels "*Atalanta*" and "*Mutine*," and three transports, found itself re-united within a day's sail of Bantry Bay. From one of the luggers the "*Indomptable*" now heard, for the first time, of the wreck of the "*Séduisante*," and perhaps the cause of the first parting of the fleet was also explicable. At any rate, thirty-three out of forty-three sail composing the whole flotilla were present, and the absence of the naval and military Commanders-in-Chief was, besides the loss of the "*Séduisante*," the only serious check they had met with.

But they might have met a worse one. They had wasted their fair wind, and it now set in foul. On the morning of the 20th the wind was still foul, but it was moderate. The haze which hung in the

atmosphere left the "Indomptable" with only fifteen friends in view. But at 10 many other sail could be made out, and it was evident that there was no real separation.

Tone falls to abusing the French Officers for their want of seamanship, all except his own Captain Bedout. I might admit some force in this opinion had I not, in my own time, received a like one respecting some of the acknowledged leading seamen in the world from authorities sufficiently high to give their opinion *primâ facie* weight. As it is, on a review, I cannot see where the want of seamanship comes in, though I can recognize the adverse compulsion under which the seamanship was exercised.

However, the result of it, seamanship or no seamanship, was that, at daybreak on the 21st of December, Cape Clear was only 12 miles off, and thirty-six out of the forty-three ships which left Brest were assembled.

The weather was delicious, and the wind was fair for Bantry Bay. Even further encouragement was not wanting, for at 1.30 p.m. the thirty-seventh sail appeared, and the "Atalanta" joined.

Where, then, was the failure? It is found in the simple note that all that day the fleet remained *under easy sail*, and did not attempt to make for the anchorage.

For this controllable failure there was the double cause of the orders issued and the absence of the Commanders-in-Chief. Nothing but want of knowledge of the state of Ireland on the one hand, and fear of the British fleet on the other, could have dictated such orders; it was direct fear of the British Navy which dictated the absence of Hoche and Morard de Galle.

On the morning of the 22nd of December the easterly wind was found to be strengthening. It had already somewhat scattered the fleet which had been concentrated before the opening of Bantry Bay the previous afternoon. There was no news of the "Fraternité." "I believe," writes Tone, "it is the first instance of an Admiral in a clean frigate, with moderate weather and moonlight nights, parting company with his fleet." He did not add that it was the first instance of an Admiral being forced into a course which he knew could only turn out to be a right one by something like a miraculous interposition of Providence.

But Bouvet and Grouchy were now setting themselves to make the best of a bad job, and were pressing the ships up towards Bantry Bay, straight out of which the easterly wind was rushing with ever-increasing strength. The fleet was much dispersed; several ships were far to leeward.

For the welcome and universal uprising which was to greet their landing, the French were well prepared. They had 41,160 stand of arms, 20 pieces of field artillery, 9 siege guns, 61,200 barrels of powder, 7,000,000 musket cartridges, and 700,000 flints. It is by an odd antithesis that Wolfe Tone should combine the catalogue of these warlike stores with the remark, when they were close up to their anchorage at Bear Island, that "Messieurs of the *État-Major* continued in the horrors!"

Now, the last thing we should have predicated of Officers of the French military Staff of those days would have been lack of *élan*, lack of the faith in the power of the French principles and the French arms, which ultimately made Napoleon the master of Continental Europe. This very curt and simple expression of Wolfe Tone's is to me like the revelation of a world of light. I seem to see the *État-Major* suddenly aroused, like a group of sleep-walkers, to the consciousness of life and thousands of feet of sheer precipice before them, over which they were about to fall. "In the horrors!" What could have caused them, but the shaking off the trammels of the *lie* which had for months controlled them, and in sight of the bare scarp of Hungry Hill, realizing that there was the choice of falling into the hands of the Irish Army on shore, or the English Fleet at sea, and no other, before them!

At half-past six that evening the "Indomptable" anchored off Bear Island.

The whole of that night it blew heavily down the bay, with snow and sleet. Bantry Bay does not present to the eye even now the picture of a soft domestic haven with peace and plenty bounding its shores. In the middle of a keen wind driving before it the cutting snow, with a possibly hostile army in front, and a certainly hostile fleet in rear, "Messieurs of the *État-Major*" may be excused for the state in which they found themselves.

Tone himself began on the 23rd to realize the situation, though he did not understand—feather-head as he was!—how much his lies had had to do with producing it. "16 sail, with 9 or 10 of the line," he says, "with Bouvet and Grouchy, are at anchor with us, and about 20 are blown to sea." The ships were scattered up and down the bay; not two together in any one spot, except one, where they were dangerously close together. He considers it useless to think of landing in Bantry Bay, and suddenly begins to see the merits of landing a much smaller force in Sligo Bay.

But now let us take away from the situation any mistakes which may have been made as to hopes of an Irish rising, and any fears of an English fleet, and we have before us nothing in any direction to produce gloom or hesitation in the mind of any Frenchman present, soldier or sailor, except in one particular, little noticed by those describers of Hoche's invasion. The Commanders-in-Chief were absent. True. But the "Fraternité" might heave in sight at any moment. The weather was atrocious. Yes. But after a storm comes a calm. Half the fleet was still at sea. Quite so, but they were under a weather shore, with numbers of safe anchorages, and there was nothing to prevent their arrival as soon as the wind moderated.

There was, however, one pressure of moderate or immoderate force according as it was looked at. The shores of Bantry Bay were not a series of farmyards and granaries, and the troops and seamen had been for weeks eating their heads off in Brest Harbour, while they waited for the chance of evading Colpoys' fleet. Provisions in all the ships were beginning to run short, and troops could not be landed merely to starve.

On Christmas Eve the whole of the Staff from the "Indomptable" went on board the frigate "Immortalité," where Bouvet and Grouchy were, to urge the latter to land. They had 6,500 men in the ships at anchor, and four field pieces. The "Indomptable" got under way on this day to move further up. She made perhaps 100 tacks, and yet did not seem to have gained 100 yards. At 6 p.m. she anchored again, having advanced some 50 yards. Tone sums up his views of the situation in two strong words, repeated, "Damn it! Damn it!"

On Christmas Day it was still blowing heavily straight down the bay. And now it was impossible even to lower a boat. "I cannot conceive," writes Wolfe Tone, "for what reason the two Commanders-in-Chief are shut up together in a frigate. Surely they should be on board the flag-ship. But that is not the first misfortune resulting from this arrangement. Had General Hoche remained as he ought on the 'Indomptable,' with his *État-Major*, he would not have been separated, and taken by the English, as he most probably is, nor should we be in the difficulties we now find ourselves in, and which, most probably, to-morrow will render insurmountable. . . . Our first capital error was in setting sail too late from the Bay of Camaret, by which means we were obliged to pass the Raz in the night, which caused the loss of the "Séduisante," the separation of the fleet, the capture of the General, and, above all, the loss of time resulting from all this, and which is never to be recovered. Our second error was in losing an entire day in cruising off the bay, when we might have entered and effected a landing with thirty-five sail, which would have secured everything. And now our third error is having our Commander-in-Chief separated from the *État-Major*, which renders all communication utterly impossible."

These, no doubt, are all words of wisdom; but, taken together, they amount to a rather late opinion that the expedition was throughout something of a mad one. Tone forgets that, whatever results the decisions taken had produced adverse to success, they had avoided the great danger of all, and which they were specially arranged to avoid, namely, falling in with the fleet of Colpoys.

The weather was now master of the situation, and prevented all possibility of landing, however much it might have been desired. It blew harder and harder. During the night of the 25th the "Immortalité," having cut her cable, passed under the stern of the "Indomptable," and bid her cut her cable, and put to sea at once. Those in the latter ship were so full of the English that they thought this was an English stratagem, and they held on with two anchors down.

In the morning there was a dense fog; they could not see a ship's length. Tone consoles himself with a new apportionment of the causes of what he has clearly known for several days to be a failure. "Notwithstanding all our blunders," he says, "it is the dreadful stormy weather and easterly winds, which have been blowing furiously and without intervention since we made Bantry Bay, that have ruined us."

Tone was certainly wrong here, because a great English expedition had many years before invaded the Island of Cape Breton by way of

Gabarus Bay; and it had met just the same sort of weather impediments which the French now met, and all it did was to wait till the weather moderated, and then go on with the invasion. What was to prevent the French from following the same plan? Possibly the growing shortness of their provisions, but certainly the knowledge that every hour's delay would bring the English nearer to them as their executioners. They were like any other burglars in fear of the police.

On the 26th of December, "several vessels, including the 'Indomptable,' dragged their anchors several times, and it was with great difficulty they rode out the gale. At two o'clock the 'Révolution,' 74, made signal she could hold no longer, and, in consequence of the Commodore's permission, who now commands our little squadron, cut her only cable and put to sea." So writes Wolf Tone, on the 27th, referring to his own Captain, Bedout, by the title of Commodore.

During the previous night, the "Patriote" and "Pluton," 74's, were forced to sea with the "Diomède," armed store-ships. So that on the morning of the 27th there only remained 7 sail of the line and 1 frigate. At ten in the forenoon the Commodore made the signal to weigh; but there was delay, and the senior military Officers came from the other ships and held a council of war on board the "Indomptable," General Harty being president, and Commodore Bedout assisting. They had now only 4,168 men left, and two 4-prs. as all their artillery. Their ammunition remaining was 1,500,000 musket cartridges and 500 rounds for the guns, with 500 lbs. of loose powder. It was resolved to make for the mouth of the Shannon directly.

The wind now came round to the southward, and the signal flew to get under way. At 4.30 P.M. three ships cut their cables. The "Indomptable" weighed one anchor and cut the other cable. Then the whole squadron, reduced to 7 sail of the line, 1 frigate, and 2 small vessels, put to sea.

As this was practically the end of the expedition, it is a convenient moment to review the situation.

It is impossible not to be struck by all this hurry, this cutting of cables, and this putting to sea. Granting that the weather was so bad that there was both dragging of anchors and parting of cables, there is not a word said of any danger to any ship thereby, and no ships took the ground in the bay. The wind was right out of the bay, and the most that could happen to any ship was to have been blown to sea. We have noticed how Bouvet with Grouchy, on board the frigate "Immortalité," cut his own cables on the night of the 26th, and endeavoured to make the "Indomptable" cut hers also. What was the object of this, when, as it turned out, the latter ship was able to hold on with only two anchors down? We must follow Bouvet to sea in order to form some notion. On the 29th, when the wind moderated, this Officer found himself 180 miles S.E. of Bantry. It seems clear that he could not have been blown there if he had brought to under the weather shore, which the coast of Ireland formed, or might have formed had he put his head to the northward on the

starboard tack. He must have deliberately put his head for Brest, with the intention of not attempting to return to Ireland. Finding himself thus 180 miles on his way to Brest, and with not more than twenty-eight days' provisions on board, he converted the situation he had himself brought about into a reason for flight, and he arrived at Brest on the 1st of January. We may suppose that the view here given was the view of the Directory, as Bouvet was "suspended from his functions."

Now let us note that on the 27th the wind at Bantry shifted to the southward, and that the inference to be drawn was that it would bring in the ships which the easterly wind had kept at sea. There is no *sequitur* so far, in the resolution of the Council of War to put to sea, even with a real idea of making for the Shannon. It is scarcely to be doubted that the orders given were due to utter disappointment with all the appearances on shore, and more fear than ever of being caught in a trap by the English fleet. As the weather was fine enough for all the ships to lower boats on this day, there was no apprehended danger from the wind to face.

It blew heavily on the night of the 27th, and the "Indomptable" ran 9 knots under her jib alone. She was at her rendezvous at daylight on the 28th, the wind having then moderated, but three ships of the line and the single frigate had disappeared. The remaining four sail of the line spent the day in standing off and on, hoping to be joined by the missing ships. The missing frigate, the "Coquille," joined them in the course of the afternoon, and at some time or other three more line-of-battle ships, as well as two of the small vessels, fell in with them.

During the night Bedout made up his mind. At 4 o'clock on the morning of December 29th, he made the signal to steer for France, and by noon on January 1st, 1797, his 7 line-of-battle ships, 1 frigate, and 2 small vessels were standing through the Goulet into the harbour of Brest.

I pointed out a few pages back that, if we summarized the immediate causes of the initial failure, we should say it arose from the nature of orders issued, and the absence of Hoche and Morard de Galle. It is now time to show that the latter cause was due to the direct action of the English Navy.

We have seen that the Commanders-in-Chief, changing their minds at the last moment, took their frigate out through the Iroise, while the main part of the fleet adhered to the original intention, and went out through the Raz de Sein. In consequence of this the "Fraternité," on the morning of the 17th of December, found she was only accompanied by the "Nestor" line-of-battle ship. These two were joined during the day by the frigates "Cocarde" and "Romaine," and the four made sail together for Bantry. I have no account of how these vessels wasted the first part of their time, and the fair wind we know they had from our account of the "Indomptable's" proceedings. Quite possibly—indeed, I see no other way of accounting for the delay—the fear of coming across some of Colpoys' ships had driven them out of their course altogether. However,

while the thirty-five ships of the fleet were, as we have seen, ready to enter Bantry Bay on the 21st of December, the "Fraternité" and her consorts were not yet near the place on the 23rd. And on that day, too, the consorts parted company with the flag-ship by neglect or accident.

Presently, the "Fraternité" sighted the coast of Ireland. But not alone. She seems to have made out the coast and an English frigate simultaneously, and the same Hoche, who was going to have every seaman shot who flinched, was now glad—being Commander-in-Chief—to make all sail in flight. She only escaped by throwing some of her guns over. Then, after some days, finding the coast clear and the weather moderate, she steered for Bantry Bay. Some idea of her utter collapse may be arrived at by remembering the date at which she ultimately reached the rendezvous. It was the 8th of January.

There, however, she met the last remnant of the expedition, the line-of-battle ship "Révolution," and the frigate "Scévola," the former being in a sinking state. The Commanders-in-Chief now concentrated their energies on transferring the ship's company and troops to the sound ship, and having done so, and having learnt that there was not a single ship left in Bantry Bay, turned their frigate's head homeward, and being many times chased by English cruisers, and almost in daily fear of their provisions giving out, were glad to hide their heads at Rochefort.

I need not go into the story of the several ships there were wrecked or taken, out of this rash enterprise, but, in concluding, it may just be noted, by way of emphasis, how the "Nestor," when she got to Bantry Bay, on the 1st of January, found there 3 line-of-battle-ships, 4 frigates, and another vessel. Showing that if the first arrivals in the Bay had only stayed there, the whole might have been re-united and the business proceeded with.

I have told my tale mainly from the French side, for it is from that side that our instruction must come. Without even going into particulars from the English side, I think we know enough to see that there was marvellous remissness there. Even Wolfe Tone had at last become aware of it, and on arriving at Brest with a whole skin, just about the time when the "Nestor" was joining the other ships in Bantry Bay, was more struck with the fact that he had not seen an English cruiser than with anything else. The wonder to him, after all, was that they had been able to do as much as they did, and he thought that the English must have taken their measures very ill.

I think that the reader of these pages must be chiefly impressed, as I am, with the madness of the whole idea of the expedition. With an exact knowledge of the spot it was intended to land on, with sure friends there, and a certainty of being joined there by a nation—and not the dregs of it—in real revolt, the danger of being caught by the English fleet was still great enough to make the proposal a reckless one. But without a fixed landing place, and without knowledge of any kind to justify a landing in Ireland, the enterprise could only have been contemplated by boundless vanity and stupidity.

Can such things be repeated? The answer may be "Yes, certainly."

But the stupid vanity of the French must become much greater, an England must be more stupid still.

France could not now be misinformed as to the state of Ireland. She would no longer gather it from the feather-heads, but from the daily papers of all shades of opinion in this country. She would certainly know most of the truth, and would not hope for a moment for any help beyond that which her own arm could give her.

But if she had, notwithstanding, gone sufficiently mad to assume that which was not, and thought that a flying column of 15,000 or 20,000 men, dropped into Ireland and then cut off from their base, could effect anything beyond surrender, she would have to consider the change from sail to steam.

If I am right in my belief that all the failure was initiated by fear of an unseen fleet, surely that fear can only be intensified by steam propulsion? Supposing that we were watching Brest at all, the escape of a great flotilla without being seen is inconceivable. We know that Hoche's fleet *was* seen, but the difficulty arose from the place of Colpoys and his distance in time. He was handicapped, just as the French were favoured, by the easterly wind. Now that is all passed away, and the only thing which could drive an efficient fleet from its watch on Brest would be danger of torpedo attack, or convenience of watching. And clearly, supposing half a dozen light and swift cruisers watching Brest, our fleet behind Plymouth breakwater would be much more in a position to interfere with an invading flotilla than was Colpoys' fleet, 30 miles to leeward of Ushant.

Then the French must think that the wind which made communication with the shore impossible for the ships of Bouvet could act the same part to-day. And now, allowing everything for the possibilities of escape from Brest, how can we reconcile it to our knowledge to admit that hostile ships might wander at will in and out of Bantry Bay for a fortnight without being interfered with by as much as a single frigate? Why, now, we might have the Mediterranean Fleet home in time to fall upon the invaders if the weather delayed their operations.

Now, in the interval between the appearance of the hostile advanced guard and its anchoring, the Admiralty would have been in full possession of the facts, and their orders would have been given. Even were it possible to be certain of weather, France could still only be certain of being caught.

We have seen the hurry and trouble of an expedition which might have had very good hopes of making the landing even before it could be known in London. Is there to be less hurry and trouble when the invader knows that, long before he lands, Government is in full knowledge of his every act?

In these cases we must look, not with our eyes, but with a possible enemy's, and, so looking, I should say we may be certain that the leader of a second expedition to Ireland must be madder than Hoche was, which is saying a good deal.

A DESCRIPTION OF THE RECONNAISSANCE WORK UNDERTAKEN BY THE HOME DISTRICT TACTICAL AND WAR-GAME SOCIETY IN THE SUMMER OF 1891.

By Major E. SATTERTHWAITE, 2nd Volunteer Battalion the Queen's Own (Royal West Kent Regiment).

1. THE object of the work was twofold—

1st, to prepare a new set of maps to be used for the minor war-game in the winter season.

2nd, to give elementary instruction in reconnaissance work to members of the Society.

2. With regard to the first object, the minor war-game, as practised by the Society, was instituted in the winter season of 1890-91, at the suggestion of one of the most experienced Adjutants of metropolitan Volunteers.

It was felt that there was room in the operations of the Society for offering some further opportunities to company Officers for the study of tactical problems.

The senior Officers of the metropolitan Volunteers have for some years, under the auspices of the Society, practised *kriegs-spiel*, the Umpires being Officers of standing in the Regular Forces.

Junior Officers have been employed as subordinate Commanders, and it has been no uncommon occurrence for these company Officers to have command of brigades of infantry and regiments of cavalry, a state of affairs which has been felt to constitute an unreality by many, but by none more than the Officers concerned.

The gulf between the instruction derivable from these theoretical commands of large bodies and the ordinary work of their battalions seemed large, and the establishment of the minor war-game was an effort to bridge over this gulf, and to lead up from the lessons of the Drill Book to the study of higher branches of tactics—to form a link between the barrack square and the manœuvre field.

In this minor war-game the commands seldom exceed one battalion, and it is therefore essential to use a large-scale map, on which the smallest movements of the smallest bodies can be shown in detail.

The post of Umpire-in-Chief has been undertaken by different Adjutants of metropolitan Volunteers, and the map used last season was an enlargement (1" to 17·6 mile) of the map issued with Lieutenant-Colonel Wilkinson Shaw's "*Elements of Modern Tactics*." This enlargement had been made by the Officers and members of the Inns of Court Rifle Volunteers, who very kindly lent the Society its maps and apparatus. This map consisted of an imaginary country, which, however well designed, almost always fails to rivet the interest of combatants in a war-game on account of its unreality.

3. With regard to the second point mentioned in Section 1, it must be remembered that military topography is not a compulsory subject for Volunteer Officers.

Until 1889, Volunteer Officers were allowed to attend the examination for promotion in tactics only, and, if they passed, their corps received a special money grant.

The other three subjects were only thrown open to them in 1889, but as yet no grant has been assigned to proficiency in them; the consequence is that the number of Officers who present themselves for examination has been, and is, small.

4. The Executive of the Society therefore felt that an effort might be made to attain the twofold object, firstly, of obtaining a good large-scale map of typical English country for its minor war-game, and, secondly, of encouraging its members to take an interest in the study of military topography, sketching, and reconnaissance.

5. In May, 1891, the circular marked A was issued to the members of the Society, with the approval of Major-General Philip Smith, C.B. Commanding the Home District, the President of the Society.

In response to this, some forty names were received, and the work of the survey was commenced.

6. The ground chosen was an area of 9 square miles, 3 miles by 3 south-east of Caterham, being the nine square miles in the south-east corner of sheet No. 27, 6" Ordnance Survey.

This ground was chosen on general grounds, because it was a typical piece of English country, such as Volunteer troops would have to operate over in time of war; and on special grounds, because Caterham is known to be the concentration point of a large number of metropolitan Volunteers in case of invasion.

7. The maps to be used for war-game purposes were the 25·33 ($\frac{1}{2500}$) Ordnance Survey, which, it will be remembered, are neither contoured nor shaded.

8. The first task was to divide the area into convenient sections for reconnaissance; and this was done on the principle of making road and paths, as far as possible, the boundaries of sections, and of giving each Officer about half a mile square to survey. The first provision ensured a definite boundary to each Officer's work, and also furnished a duplicate report on each road or path.

In all, the 9 square miles produced twenty-five sections.

9. To each group of three or four sections an Instructor was appointed, whose duties were to arrange with his Officers to meet on the ground, to explain technical terms and conventional signs, and to give instruction in contouring and in rendering an efficient reconnaissance report as to the details required.

These Instructors were all Volunteer Officers who had "passed" in military topography, and who gave their services gratuitously (although two of the number were professionally engaged in the work of coaching young Militia Officers for the competitive examination).

10. These preliminaries being settled, a further circular, marked E was issued to the Officers who desired to take part in the survey. This circular was accompanied by a cutting from the 6" map, repre-

senting the section to be surveyed; this cutting was mounted on Whatman's thick paper and provided with a scale and north point as well as a general idea of the surrounding country, the existing 100' contours being marked in red.

A group map was also furnished to the Officer who acted as Instructor to each group.

The 6" map was adopted for the field work as being less bulky and less expensive than the 25·33" map, and also as affording practice in contouring at the normal scale of horizontal equivalents.

11. The schedule of information required (marked C) was drawn up with the assistance of Lieutenant-Colonel W. W. M. Smith, R.A., D.A.A.G. for Instruction, Home District.

The authorized War Office Form for Road Reports (A.F. K 1305) was also issued where required.

12. The work was ordered to be rendered by August 31st, and the results were then transferred to the 25·33" maps.

These had been prepared by Mr. E. Stanford, of Cockspur Street, Charing Cross, at a cost of 3*l.* 12*s.* per set of twelve sheets, mounted on extra strong millboard and sized, each sheet representing an area of 1 mile by $\frac{3}{4}$ mile and measuring 25" by 18 $\frac{3}{4}$ ".

The contours were then pencilled in by means of proportional compasses, and subsequently coloured with Faber's indelible liquid carmine ink. The contours were numbered according to their height at junctions of sheets and along roads and salient features, arrowheads pointing downwards being also used to show at a glance the direction of the slopes. Watercourses were also marked in blue.

The whole were then sized again and varnished.

Faber's inks were found admirable for the purpose, as they showed no sign of "running" when the size and varnish were applied; the "Camel" fountain pen was also found useful for this work.

13. The maps themselves thus showed the contour of the terrain, but for the purposes of the Society something more was required, and the numerous details collected in paragraphs 2 to 9 of the schedule (C) were too valuable to be wasted.

Umpires at kriegs-spiel are constantly asked, "Can I move my troops through this wood?" "Does that hedge afford cover from view or from fire?" "Can I utilize this farmstead for defence?" Or rather, the combatant usually claims that the wood, hedge, or farmstead is an ideal one for his purpose. These questions usually can only be answered by one intimately conversant with the country.

14. The 25·33" maps readily lend themselves to the tabulation of such details. Each enclosure (wood, field, or road) is provided with an index number, and the plan adopted has been to cut the edges of a foolscap book as a "Where is it?" book is cut, letting each division of the book contain the information relating to one sheet of the war-game map.

Within, against the number of each enclosure, a note is made of its characteristics, as rendered by the Officer who surveyed it. Thus—

Sheet 1. Enclosure 120.

"Arable field; high hedges; no ditches; gate to road east."

Sheet 3. Enclosure 413.

"Stonepit Wood; trees, 30—40' high; thick undergrowth; no paths; boundary hedges thick, with no ditches; good field of fire to the south."

Naturally the information rendered by some of the Officers is much fuller than that of others, especially as many Volunteer Officers have little daylight time at their disposal; but on the whole the information has been intelligently and correctly given, and the contours have "joined" on the edges of sections in a manner that is surprising, considering the inexperience of many of the surveyors.

15. As a recognition of the work done by the Officers engaged in the survey, the Society has had the various reports examined, and a certificate will be issued to each Officer, signed by the President, who throughout has taken the greatest interest in the work.

16. The maps will now be used for the minor war-game, at the Westminster Town Hall, and may be borrowed by subscribing battalions for kriegs-spiel at their own headquarters, on application to the Honorary Secretary.

A.

HOME DISTRICT TACTICAL AND WAR-GAME SOCIETY.

Before the commencement of the next Kriegs-Spiel Season, it is proposed to prepare a new set of Maps for the minor War-Game, in place of those hitherto used, which were kindly lent by Col. Russell, of the Inns of Court R.V.C.

The Maps to be prepared are the 25·33 inch Ordnance Maps of the Country round Godstone and Oxted, which is close to the line to be occupied by the majority of the London Volunteers on mobilization.

The assistance of Members of the Society and Officers of Subscribing Corps is requested in the preparation of these Maps.

A combined Survey will be made, and instruction given on the ground, in Military Sketching, Reconnaissance, and Contouring.

A small section of country will be assigned to each Officer, or if desired, a number of adjoining sections will be assigned to a Battalion.

A definite Schedule of the information required will be furnished to each Officer, which must be returned to Col. Haddan, 66, Sumner Street, Southwark, S.E., by August the 31st, to whom also the addresses of Officers proposing to participate in the work should be sent immediately.

Each Section will be calculated to contain about 2 days' work.

Commanding Officers are requested to give publicity to this Scheme in their Orders, so that all Officers may have due notice.

By order of the Committee,

E. SATTERTHWAITE, *Major,*
Assistant Secretary.

30, Throgmorton Street, E.C.
7th May, 1891.

B.

HOME DISTRICT TACTICAL SOCIETY SURVEY, 1891.

1. The Survey is to be made with a view to working up the 25·33" Ordnance Maps for the purpose of the Minor War-Game.

The information required will be suitable to this end, and will not comprise all that is required for a regular Military Survey.

The Maps to be used will be the 6" Ordnance, and the results will be transferred to the 25·33" by the Staff of the Society. Contours to be at 20' Vertical Interval.

2. The Country chosen is that bounded on the North by the Chalk Hills South-East of Caterham.

If the present Survey is successful, an extension of the Map can easily be made next summer.

3. Each Officer will receive a Section of Country to survey; there will be no objection to his obtaining the assistance of other Officers or N. C. Officers of his Battalion.

Each 3 or 4 Sections will be grouped under one Instructor, who will arrange with the Officers under him to meet on the ground.

4. The Instructor's duty will be to explain technical terms and conventional signs, and generally to put the Officers into the way of rendering the information required.

The operation of Contouring, either with the Clinometer or Aneroid, will form a principal part of the work required.

5. Great care must be taken that no damage is done to crops.

6. Each Report will be signed by the Officer making it, and forwarded with the Map to his Instructor, who will see that all the Reports of the Officers of his group are collected and forwarded to Col. Haddan, 66, Sumner Street, Southwark, by August 30th.

7. Railway Station for Group *A* (Sections 1, 6, 10, 11) Caterham.

"	"	"	<i>B</i> (	"	2, 3, 7, 12), Caterham.
"	"	"	<i>C</i> (	"	4, 5, 8, 9, 13, 14), Godstone.
"	"	"	<i>D</i> (	"	15, 16, 17), Oxted.
"	"	"	<i>E</i> (	"	18, 19, 20, 21), Oxted.
"	"	"	<i>F</i> (	"	22), Oxted.

N.B.—Section 22 was divided into 4 Subsections.

C.

DETAIL OF INFORMATION REQUIRED.

1. *Contours.*

These will be marked on the map (enclosed) in red ink at 20 feet vertical intervals.

The 100 feet contours will be found marked already (4 contours must therefore be marked between each) certain Benchmarks along roads and at certain other points will also be found marked 241, 322, and 417. These heights have been underlined and marked as above.

2. *Roads.*

Information as to each road in a section (including the Boundary Road) should be given as under:—

- | | | |
|---|-----------|---------|
| <i>A.</i> The road leads from | —Miles to | —Miles. |
| <i>B.</i> Metalled or not; materials for repairs. | | |
| <i>C.</i> Average and minimum width. | | |
| <i>D.</i> Details of any defile, hollow road, or embankment. | | |
| <i>E.</i> Fences (see 5). | | |
| <i>F.</i> Details of bridges and culverts over or under which the road passes. | | |
| <i>G.</i> Anything that may tend to retard the usual rate of marching, such as steep grades, bad state of repair, &c. | | |

3. *Paths.*

- | | | |
|--|-----------|---------|
| <i>A.</i> From | —Miles to | —Miles. |
| <i>B.</i> Nature of soil. | | |
| <i>C.</i> Nature of gates, stiles, &c. | | |

4. *Villages.*

- A. Name,
- B. Material of houses.
- C. If suitable for defence.
- D. If commanded from neighbouring positions ; if screened from distant Artillery fire.
- E. Materials for strengthening defences.
- F. Buildings suitable for keep.
- G. Water supply.
- H. Surrounding fences and walls.
- J. Approximate population ; useful Stores ; farms or trades.

5. *Fences and Walls.*

- A. Height.
- B. Ditches, average depth : which side of hedge.
- C. Suitability for defence.
- D. Gates to be marked on map thus —|-|—.
- E. Average character of hedgerow trees.

6. *Woods.*

- A. Average height, frequency, and nature of trees.
- B. Density or otherwise of undergrowth as affecting the passage of all arms.
- C. Paths or streams traversing.
- D. Defensibility of edges and Boundary fences.
- E. Field of fire from edges.

7. *Railways.*

- A. Single or double.
- B. Cutting or embankment.
- C. Stores of fuel or plant.

8. *Streams.*

- A. Width and depth.
- B. Nature of adjoining country, if marshy, &c.
- C. Liability to floods.
- D. Watering places.

9. *The Country.*

- A. Marshy, dry, wooded, or open.
- B. Arable or grass to be written across each field on the map.
- C. Any details as to the view to be obtained from any commanding points, especially as to the possibility of seeing troops marching along the roads, whether within or without the section.

Further information can be obtained from—

Col. Haddan, 66, Sumner Street, Southwark, S.E.,
or Major Satterthwaite, 30, Throgmorton Street, E.C.

FOREIGN SECTION.

THIS portion of the Number, hitherto the Occasional Notes, has now become the Foreign Section, and is reserved for articles, either original or compiled, on professional subjects connected with Foreign Naval and Military matters; also for notices of Professional Books, either Foreign or English.

The Council of the Institution wish that this section shall be developed still further, and I have undertaken to continue my Editorship during the current year, with a view of aiding them in carrying out this work. It seems to me possible to make this section, and consequently the Journal, the means of keeping our Members acquainted with all naval and military progress abroad *pari passu* with that progress; and I shall be glad to receive from members of both Services, including in the latter those of the Auxiliary Forces, suggestions, information, or offers of assistance.

It is desirable, further, that I should state that, as regards editing the Naval matter in the Section, I shall have the aid of Naval Officers, thoroughly competent to give good advice and to pronounce sound opinions.

It must, however, be borne in mind that, as the change from a quarterly to a monthly issue has been made in order to ensure the more prompt publication of the Lectures after their delivery than has hitherto been the case, the Foreign Section will, as a rule, be restricted in extent during the Lecture season in the first half of the year, and will be prominent in the second half.

It is requested that communications and books for review (the latter under cover to the Librarian) may be addressed to me at the Royal United Service Institution, Whitehall Yard, London, S.W.

LONSDALE HALE,

Colonel R.E. ret.

THE NAVAL SCHOOLS OF THE CHIEF CONTINENTAL POWERS.

Compiled by Captain W. TENISON, the Manchester Regiment, from papers in the "Rivista Marittima," by 1st class Commissary DANTE PARENTI.

France.

THE Naval School of France is established in the roads of Brest, on board the "Borda," to which are attached the corvette "Janus," and the transport "Allier," under the authority and supervision of the Maritime Prefect.

The course of instruction lasts two years, at the end of which time the students, if successful, obtain the rank of "Aspirants de 2me Classe."

Maintenance and Outfit.—A student has to pay 700 fr. per annum for his maintenance and 1,000 fr. for outfit, and if obliged to repeat a year's course, must pay a supplementary sum for outfit, fixed by the School authorities.

The fees for maintenance are paid quarterly, in advance, either to the departmental receivers, or to the treasury in Paris.

There are, however, exemptions made in certain cases, when the whole amount, or half the amount, either for maintenance or for outfit, may be remitted.

Every student must pay to the Paymaster of the School the following sums on admission:—If he has obtained no exemption from the costs of outfit, 800 fr. for the 1st year, and 200 fr. at the beginning of the 2nd year.

If he has obtained a remission of half the costs of outfit, 430 fr. for the 1st year, 130 fr. at the beginning of the 2nd year. If he has obtained entire exemption from these fees, 60 fr. for the 1st year, and 60 fr. for the 2nd year. In addition to this, every student must pay 15 fr. into a common fund (for repairs, &c.). All are forbidden to have money or valuables.

Conditions of Admission.—The candidates must send in their applications for admission between the 1st and 25th April, to the Prefecture of the Department wherein reside their family or tutor. Candidates must certify (a) that they are Frenchmen, or belong to one of the categories provided for by the Laws of 16th December, 1874, 14th February, 1882, and 28th June, 1883 (these laws refer to foreigners who have been naturalised French subjects, &c.); (b) that they are over 14 and under 18 years of age before the 1st January of the year of application. No exceptions are allowed as to age.

Candidates must send in the following documents:—

(a.) Birth certificate, certified by a magistrate or justice of the peace.

(b.) Certificate of French citizenship, or equivalent document, in accordance with the above-named laws.

(c.) Certificate of recent vaccination.

(d.) A stamped bill for the amount due in payment for fees of maintenance and outfit.

(e.) Certified statement of previous studies.

In every instance, the reason for demanding gratuitous maintenance or outfit, either wholly or in part, together with all the pleas for the concession of this benefit, must be specified.

Entrance Examination.—The examination for admission is competitive, and takes place simultaneously in Paris and other maritime centres.

A Rear-Admiral or Captain nominated by the Minister of Marine is president of the Board, and supervises the examination. The examination is both written and oral. The Board consists of four members, two for literature, and two for sciences.

Medical Examination.—Candidates must undergo a medical examination, which takes place at each centre of examination. The Board consists of a superior marine official as president, a Lieutenant and two Medical Officers as members.

The sight tests are particularly severe, and are as follows:—

1. To read at a distance of 2 metres with either eye letters No. 15, black on white, Snellen's scale, lighted by a light placed at 50 centimetres' distance from the letters.

2. A repetition of the first test, with the atmosphere partially illuminated by means of a special apparatus.

3. Selection of colours.

Written and Oral Examinations.—The written examinations take place simultaneously in the named localities during the first three days of June. The candidates must assemble at the locality they have selected, without further intimation. They are called up in alphabetical order and placed at a distance of $1\frac{1}{2}$ metres from each other, and in such a manner that no communication may pass between them.

The examination papers are sent out from the Ministry, and must be opened on the days indicated:—

1st day.—7 A.M. Arithmetic and Algebra, $3\frac{1}{2}$ hours.

2 P.M. Drawing, 1 hour. English Composition (without dictionary), 1 hour.

2nd day.—In the morning, French Composition, $2\frac{1}{2}$ hours.

2 P.M. Descriptive Geometry, $1\frac{1}{2}$ hours. Half hour's rest. Trigonometry, 1 hour.

3rd day.—Plane and Solid Geometry, and Analytical Geometry, $3\frac{1}{2}$ hours.

The written papers are corrected by the Board in Paris. The Board select the candidates who have qualified, and who may present themselves for oral examination.

These oral examinations are divided as follows :—

(a.) English, History and Geography.

(b.) French and Latin.

(c.) Plane and Solid Geometry, Descriptive and Analytical Geometry, Physics and Chemistry.

(d.) Arithmetic, Algebra and Trigonometry; and they begin in Paris on the 1st or 2nd July, and in the other centres in succession, wherever candidates present themselves in sufficient numbers. (Should the number be insufficient in any locality, the examination does not take place there, but the candidates are directed to present themselves at some other centre.)

The examinations are public.

The course of instruction begins on the 1st October, and the candidates who have been declared successful must present themselves at Brest on the 30th September, where they have to undergo a second medical examination under the presidency of the Commandant of the Naval School.

Schedule of Studies for Final Examination.

Arithmetic in its entirety, Algebra, and Elementary Geometry.

Descriptive Geometry, as far as the plane section of a cone and cylinder; Analytical Geometry, and Rectilinear Trigonometry.

The use of the Tables and Solution of Triangles.

Physics.

Organic Chemistry.

Greek and Roman History; Mediæval and Modern History.

Geography (special knowledge of Central Europe, and particularly French Geography).

French, English, Italian, Latin.

A knowledge of German gives a claim for preference, and so also does a certificate of higher education, such as a diploma in Literature, &c.

The candidates are classified according to the points obtained in the written examination, to which are added the points obtained in the oral examination after multiplication by the following coefficients :—

French 6, Latin 7, English 5, History 6, Geography 4, Arithmetic 6, Algebra 10, Trigonometry 5, Geometry 8, Physics 7, Chemistry 6.

About 90 students are annually admitted into the Naval School.

The Staff of the School consists of :—

- 1 Post-Captain—Commandant,
- 1 Captain—Second in Command,
- 9 Lieutenants—Professors,
- 2 Chief Engineers—Professors,
- 1 Administrative Official—Treasurer,
- 1 Chief Medical Officer,
- 2 Medical Officers of 2nd Class,

1 Purser,
 10 Civilian Professors,
 112 Mates, Quartermasters, &c.—Instructors,
 31 Servants, cooks, barbers, &c.,

and a complement of 110 sailors.

The Professors.—The military Professors of Sciences receive a salary of 5,000 fr., which is increased to 6,000 after 3 years', and to 7,000 after 6 years' service.

Those who have charge of the practical work receive 814 fr. per annum in addition to their ordinary pay.

All the officials hold their appointment for 4 years, which term can, however, be extended. The civilian Professors are divided into three classes, their salary varying according to the class to which they belong, the maximum being 6,745 fr. after 20 years' service, the minimum 3,675 fr.

The Commandant is the Chief Director of Studies; he is President of the Council of Instruction, and of the Council of Administration in the absence of the Maritime Prefect.

The Second in Command takes the place of the Commandant during his absence, and has authority not only over the Officers of the Staff, but also over the Professors and civilians attached to the School. He is a member of the Councils of Instruction and Administration.

Each Lieutenant has charge of one subject of instruction, the senior taking the place of the Second in Command during his absence.

Four Lieutenants discharge the duties of Captains of companies; whilst all the Lieutenants, with the exception of the senior, take their turn as Officers of the watch.

The Principal Medical Officer with his two assistants has charge of all sanitary measures. A dentist attends on board every Wednesday.

There are four distinct Councils:—

1. The Council of Instruction.
2. The Council of Administration.
3. The Council of Promotion.
4. The Council "De Perfectionnement."

The first, examines all questions relative to instruction, supervises the studies, examines the instruments, the journals, the publications, &c., in fact everything that relates to the studies of the pupils.

The second, has charge of everything relating to the administration and finances of the School.

The third, of all matters concerning the promotion of the personnel on board the "Borda" and the "Janus" and "Allier."

The fourth, of all matters of greater importance, as the modification of the courses of study; and regulates the distribution of the studies, and arranges the programmes of the entrance examinations.

The students are divided into two sections, the senior division con-

sisting of those in their second year, the junior of those in their first year. Each division is subdivided into two squads or companies. The students who are distinguished for good conduct and have obtained the first ten places in their studies obtain the title of "Brigadier" or "Sous-Brigadier."

The instruction is divided into three distinct groups: The first comprises Literature, History, English, and German; the second the Special Sciences, Mechanics, Astronomy, Navigation, Physics, Chemistry, &c.; the third is reserved for professional attainments such as Seamanship, Engines, Artillery, Naval Construction, Torpedoes, &c.

All lectures take place on board ship, with the sole exception of the course of Physics and Chemistry, which is held in the Central Laboratory of the Arsenal of Brest.

Carbine exercises on dry land.

Practical Seamanship on the ships attached to the School.

At the termination of the yearly examination, one of the attached ships is commissioned for a cruise of one month, under the command of the Officer in charge of the course of instruction in Seamanship. If for a distant cruise, the Commandant of the School goes in chief command, together with the Chaplain, the Chief Medical Officer, and three Officials or Professors. This takes place usually about the 20th July.

The examinations are directed by a Board presided over by the Maritime Prefect, and composed of the Commandant, and Examiners nominated by the Ministry. The opening day of the examination is fixed by the Minister, so that the examinations may end by the 31st July at latest. They are held on board the School ship; the practical work and infantry exercises on dry land.

The procedure is as follows:—

1. Questions in English, Analysis and Mechanics, Astronomy and Navigation, Physics and Chemistry, Naval Architecture, Machinery, and Torpedoes.

2. French Composition, and questions on Literature and History.

3. The Judging of the Drawings done during the year.

4. Nautical Calculations and Observations.

5. Questions on Seamanship, Artillery, and Infantry.

The students in each division are divided into 7 groups each of 13 or 15; they undergo the same examinations on the same day, only one trial being allowed.

The examinations last 7 days for all divisions, except that in Seamanship, which, being theoretical and practical, lasts 14 days. The Examiner sets the questions and marks the papers, and the Professor of the subject under examination, although present, cannot interfere in any way either as regards the questions or the marks adjudged.

Prizes.—Since the foundation of the School, the three students at the top of the list in the final classification have received the following prizes, viz.: a gold watch, a sextant, and a telescope; whilst those of the senior division who distinguish themselves in practical

work receive prizes consisting of revolvers, binoculars, &c. At the end of the final examination the students go on leave whilst awaiting their appointment as "Aspirants de 2me Classe." As soon as they obtain their commission they have to embark on the training ship "Iphigénie" for a ten months' cruise.

Interior Economy of the "Borda."—All cases of sickness are treated in the infirmary on board.

Very serious cases, however, are removed to the Naval Hospital, notification being sent to the parents.

The students are permitted to smoke during the hours of recreation.

The code of punishments is as follows:—

1. Reprimand.
2. Punishment drill during recreation hours.
3. Confinement in the guard room (up to 10 days).
4. Imprisonment (5 days).
5. Cells.
6. Dismissal or expulsion.

Each of these punishments carries a certain number of bad marks, which, when they amount to 200 in a quarter, may lead to dismissal.

The bad marks are—

For reprimand, 2.

For reprimand from Second in Command, 3.

For punishment drill, 3, with an additional 2 for each successive day of punishment.

For guard room, 8, with an additional 3 for each successive day.

For simple imprisonment, 24, with an additional 6 for each successive day.

For close imprisonment, 56, with an additional 10 for each successive day.

In addition to these punishments, 24 bad marks deprive a student of the privilege of leave of absence.

"Brigadiers" and other selected students punished with imprisonment lose their distinguishing badges for three months.

Other Schools.—"École d'Application du Génie Maritime" in Paris: Students are selected from youths who have passed at least two years in the "École Polytechnique," which is a military school under the control of the Minister for War. The number admitted is determined by the Minister according to requirements. Besides the actual pupils, a certain number of French and foreign youths are permitted, with the Minister's sanction, to attend the technical lectures only; but cannot have access to the documents and archives of the School. The examination takes place yearly in Paris, on 1st October, before a Board presided over by the Director of the School. The course lasts two years, beginning on 1st November and ending on 30th June.

The hours are from 8.30 to 10.30 A.M., and 12 noon to 5 P.M.; the students must attend all lectures, &c.; the subjects of study are Naval Construction, Resistance of Materials, Naval Architecture, Machinery, Technology, Naval Artillery, Processes in use for obviating the Errors of the Compass, Accounts, English, &c., &c.

There is also a Torpedo School and a School of Gunnery at Toulon, a School for Machinists at Brest, a School of Medicine, and a School of Pilotage.

(To be continued.)

A SHORT ACCOUNT OF RECRUITMENT, CONDITIONS, AND DURATION OF SERVICE IN THE GERMAN NAVY.

Compiled by Captain H. W. L. HOLMAN, R.M.L.I.

RECRUITS for the personnel of the German Navy are obtained from the following sources:—

(a.) Boys entered for a period of twelve years' service and who are trained to furnish petty and warrant officers for the executive duties on board men-of-war.

(b.) Men entitled to do one year's military service, called one-year's volunteers.

(c.) Men drawn from the seafaring population, who do three years' active service, called three years' volunteers.

(d.) Men from the country population, who do an additional year's active service to learn nautical duties and who are called four years' volunteers.

Before treating of the conditions of entry and service of the above categories, it will be necessary to give a short account of the naval establishments on shore, where the men are trained, and where they return on paying off.

THE LAND SECTIONS OF THE NAVY.

- (a.) The two seamen divisions.
- (b.) The two workmen divisions.
- (c.) The two sea or marine battalions.
- (d.) The seamen-artillery divisions.
- (e.) The torpedo divisions.
- (f.) The ships' boys division.

(a.) *The Seamen Divisions.*

The 1st seamen division is in the Baltic district command at Kiel
The 2nd is in the North Sea district command at Wilhelmshaven.

1. The object of the seamen divisions is to form a depôt, from which the nautical personnel for manning the ships is drawn, and to which it returns on paying off.

2. Each of the two seamen divisions is divided into two sections, and each of these into two reserve or depôt companies. If the number of men in one of these companies exceeds 250, a branch company is formed while this state of affairs lasts.

3. The strength of the seamen divisions is based on the peace

establishment. Each of the two divisions is made up of men who perform the purely nautical duties of ships, such as taking the helm, boat work ; quartermasters, gunners' mates, &c., &c., and ships' stewards.

Midshipmen and Naval Cadets belong to the establishment of the 1st seamen division.

The Officer Commanding divides the men as evenly as is practicable among the companies, so that each of them shall consist of men recruited in different years, and of each of the categories of the supply.

4. Apart from their other divisions the companies are also split up into skeleton or nucleus crews, so that for every ship they would have to man in case of mobilization, or if their strength is not sufficient for this, at least for those ships which would have to be got ready first, there is laid down on paper a nucleus or skeleton crew, which is ready to undertake at once the most important duties on board. The men must always know for what ships they are told off.

5. The training in the seamen divisions is first of all directed towards giving each man the ordinary military training in rifle drill and general service instruction, and then in making him acquainted with life on board a man-of-war. In the latter respect, the necessary applications have to be made to the superintending naval authority of the district.

6. The training of the men remaining on shore has to go on continuously, and as few men as possible are to be taken from it for fatigues, &c. Rifle drill must be carried on repeatedly throughout the whole year, as one of the most important means to discipline. Gymnastics and service instruction generally go on at the same time. Rifle-shooting and swimming can be improved on shore better than afloat. Alongside the above, rowing, boat sailing, knotting and splicing, sail-making, signalling, aiming drill, revolver practice, &c., have to be done.

7. The men adapted to particular branches of service have to be selected and trained on board a drill-ship or school. The divisional schools offer a means for this.

8. The one year's volunteers who seem fitted for the position of Officers or petty officers on the unattached list must be carefully trained for it; and the opportunity for exercising them in giving words of command and conducting themselves as superiors will be found on shore.

The four years' volunteers from the country population, on the completion of their one year's military training, must as a rule receive a year's instruction on board a drill-ship for volunteers. If they cannot be so appointed on the completion of their military training, they must be sent to the guard-ship for their preparatory nautical training. The same course must be pursued with men from the seafaring or half-seafaring population, if they have not a sufficient sailor-like training, as far as the circumstances of the establishment of the drill-ships will allow.

(b.) *The Workmen Divisions.*

1. The object of the workmen divisions is to train the personnel named below under Section 3; they are a depôt from which this part of the personnel for manning the ships is drawn, and to which it returns on paying off.

In case of necessity they have to supplement the labour power of the dockyards.

As with the seamen divisions, the first of these divisions belongs to the Baltic, the second to the North Sea district.

2. Each of the two workmen divisions is split up into five depôt companies, numbered 1 to 5. If the numbers of any company exceed 250, a branch company is formed, which keeps the number of its parent company.

3. The strength of the workmen divisions is based on the peace footing.

The 1st company is divided into an engineer section and an accountant section.

The engineer section is composed of the engineer staff.

An engineer of over eight years' seniority, or a senior one under eight years, conducts and looks after the military-technical training of the engineer section. The accountant section comprises the junior branches of the Paymaster's department who rank with seamen, leading seamen, &c. A Paymaster of either over or under eight years' seniority conducts and looks after the departmental training of the accountant section.

The 2nd and 3rd companies are composed of firemen and stokers.

The 3rd company has also carpenter's crews, sail-makers, painters, coopers, shoemakers, tailors, &c.

The 4th company is formed of writers, storekeepers, sick-berth stewards, gunsmiths, bakers, &c.

The 5th company is formed of carpenters, &c., like No. 3.

4. In the workmen divisions also, efforts must be made to maintain combinations, to form skeleton crews for ships, and to make them acquainted with their respective ships and engines.

5. Rifle drill, gymnastics, and general service instruction form the basis here also on which the technical training is grounded. These exercises must be repeated from time to time.

Endeavours must be made that every man on shore learns to swim, and goes through an annual course of musketry.

(c.) *The Two Sea or Marine Battalions.*

These battalions are for the defence of the naval ports and also form part of the crew in ships.

Each battalion has four companies. The 1st battalion is quartered at Kiel, the 2nd at Wilhelmshaven.

(d.) The Seamen Artillery Divisions.

The seamen artillery divisions are for manning the coast artillery and torpedo batteries, and for laying down mines and making booms.

The 1st division is divided into four companies, the 2nd and 3rd into three each.

(e.) The Torpedo Divisions.

The object of the torpedo divisions is to train the personnel intended for service in connection with torpedoes and mining.

They form the depôt from which—

(a.) The entire crews of torpedo-boats,

(b.) The personnel for working the torpedo fittings and mining arrangements on men-o'-war,

is drawn, on named ships being commissioned, and to which they return on paying off.

They have to supply, besides, sufficient military under-personnel for the torpedo depôt and the torpedo departments of the dockyards.

Each of the two divisions is divided into two depôt companies. If the strength of either of these exceeds 250, a branch company is formed for the time being.

Each of the two torpedo divisions contains—

Boatswains' mates, artificers, quartermasters, stokers, seamen, &c., for torpedo duties.

For such part of their theoretical training as cannot take place in the schools of the torpedo divisions, the men are appointed to the schools of the seamen and workmen divisions, or to the schools for warrant officers.

The one year's volunteers who are suitable for the list of unattached officers or petty officers are to be carefully trained for it.

(f.) The Ships' Boys Division.

1. The object of the ships' boys division is to train up seamen and petty Officers for the Imperial Navy.

2. Training as ship's boy lasts three years.

During this period the boys are not regarded as belonging to the military forces of the land, but as pupils. At the end of the third year (with the exception named in Section 4) they are sworn in and are under military law.

3. At the end of three years the boys if they have acquired sufficient nautical training, are transferred as seamen or leading seamen to the seamen divisions.

Further promotion depends on the conduct and qualifications of each one, as well as on the fulfilment of the regulated requirements.

4. In the existence of particular circumstances a boy who after

three years' training, is not fit to be made a seaman, may be allowed to remain another year as ship's boy, with the consent of the Commander of the naval station.

Whoever wants to join the ships' boys division must report himself personally at the headquarters of the Landwehr battalion of his home or, if possible, at the headquarters of the ships' boys division at Friedrichsort, near Kiel.

At the same time the following papers must be produced:—

- (a.) Certificate of birth.
- (b.) Written consent of father or guardian, attested at the local police office.

An examination in reading, writing, and arithmetic follows, together with a medical examination. As soon as both these examinations are satisfactorily completed and the boy seems suitable for entry into the ships' boys division, the headquarters of the Landwehr district send, on the 1st of the month following the examination, the undermentioned papers to the ships' boys division at Friedrichsort:—

- (a.) The certificates mentioned above.
- (b.) The certificate of the military surgeon who makes the medical examination, in accordance with the requirements mentioned hereafter, approved by the Commander of the Landwehr district.
- (c.) The examination certificate of the boy in reading, writing, and arithmetic.

1. The boy must be usually 15—16 years old, and only in cases of great bodily strength may he be entered at 14 as an exceptional case. The limits are, that a boy must have completed his 14th year on the 1st April of the year of entry and must not have completed his 17th year on the same date.

2. The boy must be thoroughly healthy, strongly built in proportion to his age, free from bodily defects and apparent tendency to chronic disease, good eyesight (no colour-blindness), good hearing, free from stuttering.

Under $14\frac{1}{2}$, the candidate must be at least 4 feet $5\frac{1}{2}$ inches in height, with a chest measurement of at least $27\frac{1}{6}$ inches; over 15, a minimum height of 4 feet $6\frac{5}{8}$ inches, and a chest measurement of at least $28\frac{3}{4}$ inches with the lungs empty. Between $14\frac{1}{2}$ and 15, the nearer the boy is to the latter age the nearer his height and chest measurement must be to those required for that age.

3. The boy must write legibly and fairly correctly, read without difficulty, and be able to do the first four rules of arithmetic.

4. On arrival at the place of enlistment, the boy has to pledge himself to a three or, if necessary, four years' training period and to nine years' service in the Imperial Navy at the end of it.

This completes the description of what the Germans term "Land

sections of the Navy." Under heading (f) we have briefly described the conditions of entry and duration of service of the ships' boys, the first category of the supply of men for the German Navy, so we can at once proceed to the other categories.

THE ONE YEAR'S SERVICE VOLUNTEERS.

General Observations.

1. Young men of the country population who are in possession of a certificate authorizing them to do one year's voluntary service may be enlisted into the sea or marine battalions, the seamen artillery divisions, and if they are shipwrights by profession, into the craftsmen sections of the workmen divisions. They are bound to clothe, fit themselves out, and keep themselves. As far as the interests of the Service will allow, opportunities may be given to them to improve themselves in their own trade. For this purpose their training in garrison duty may be made easier.

2. Young men, sailors by profession, who have the certificate authorizing them to do one year's voluntary service, or those who have passed the examination for mate, may be entered into the seamen divisions as one year's volunteers.

3. Young men in possession of the certificate authorizing them to do one year's voluntary service, may be entered into the engineer sections of the workmen divisions if they have either—

- (a.) A certificate of capability as engineer of the 1st, 2nd, or 3rd class on board German ocean-going steamers; or,
- (b.) Certificates of having done over nine months' practical work in the construction of ships' engines and over three months' employment as an assistant with an engine in work; or
- (c.) If they have done at least a year as engineer or assistant engineer on board sea or river steamers and can show good certificates of having done so.

4. The men mentioned under headings 2 and 3 are not bound to clothe and feed themselves.

5. All one year's volunteers, as far as they seem suited by their general education and service utility, are to be trained to become petty or warrant officers, or Officers on the unattached list of the sea battalions, of the seamen artillery, or of the corps of naval engineers. The respective Commanding Officers are responsible that the necessary steps are taken in this direction. The station Commanders must also help by making inspections.

6. The entry of one year's volunteers who clothe and feed themselves is not limited as to number in any of the naval sections.

7. The entry of one year's volunteers takes place on the 1st February, 1st April, 1st July, and 1st October for the seamen divisions; 1st February and 1st October for the workmen divisions;

1st April and 1st October for the sea battalions and seamen artillery divisions.

The notification of their being required for one year's voluntary service may either be made on one of the above-named days or in the course of the following three months.

8. On the notification that they are required for service, they have to produce either the mate's certificate and a magistrate's certificate as to conduct, or the permit for one year's service and a magistrate's certificate as to conduct since the permit was granted.

9. One year's volunteers in the sea battalions and seamen artillery divisions are as a rule not to be sent on board ship as part of the crew in peace-time against their wish, nor are they to be transferred from one garrison to another.

10. Medical men can either do their service like other one year's volunteers in the sea battalions or seamen artillery divisions, or follow the course laid down for entry into the medical branch.

The Training of the One Year's Volunteers in the Seamen Divisions.

1. The Commanders of the seamen divisions have to decide whether the one year's volunteers assigned to their commands are to be sent to gunnery ships, training-ships, or ships of the evolutionary squadron, or how the training of each individual may be best furthered in accordance with his qualifications.

The attendance of one year's volunteers in the seamen divisions at the naval schools is only so far permissible as their training for war service, which must come first and foremost, leaves time for.

2. After a period of six months' service, one year's seamen who are worthy of selection to qualify themselves for Reserve Officers, may be promoted to leading seamen in addition to the establishment, but without the higher rate of pay. As far as practicable, their further training for the rank of Reserve Officers is to be placed in the hands of specially appointed Officers.

3. Before the disembarkation of such one year's volunteers their qualifications and conduct are to be entered in detail in their conduct book, and the Captain of the ship is to make a note to the effect, in case he considers the man in question suitable for entry into the list of unattached Officers later on.

4. Before the expiry of the year of service those who have been made leading seamen are subjected to a theoretical and practical examination. This examination is held by a Committee and includes, besides the general duties appertaining to the rank and calling of an Officer, those particular ones that fall to the share of a Sub-Lieutenant.

5. Those who pass the examination are promoted to petty officers and dismissed, provided by the Commander of the seamen division with a certificate setting forth their qualifications for Sub-Lieutenant in the Reserve, as far as their general education renders them suitable for it.

If the candidate fails in the examination owing to want of nautical knowledge, he may be given a qualification certificate for the seamen artillery, if otherwise fully suitable.

Should he not be quite up to the necessary requirements for this, he may be given a certificate of qualification as Reserve warrant or petty officer. The qualification certificate is to be given to would-be Reserve Officers on their discharge.

6. Those one year's volunteers who have qualified as Reserve petty officers may be promoted to leading seamen on the day of their discharge from active service.

7. Any further modifications concern the Commanders of the seamen divisions.

Training of the One Year's Volunteers at the Workmen Divisions.

1. One year's volunteers may be entered in the engineer sections as engine-room artificers (5th class). The entry of one year's volunteers as stokers is not allowed.

2. The Commanders of the workmen divisions must so direct the training of the one year's service engine-room artificers (5th class) that, as far as possible, petty officers, warrant officers, or assistant-engineers on the unattached list are obtained from them.

3. Those one year's volunteers who, from their general and technical education, justify the supposition that they will obtain the qualification for assistant-engineer may be promoted after six months' service to engine-room artificers (4th class), and do duty as engine-room artificers (3rd class). If they have obtained a good certificate of service and have shown by a theoretical and practical examination, held by a mixed Board of naval Officers and engineers, that in regard to military duties and the general duties of the rank and calling of naval engineer they are fit for that position, they receive on their discharge a certificate of qualification and at the same time promotion to petty officer.

All further modifications concern the Commanders of the workmen divisions.

4. Professional shipwrights who are entered in the craftsmen sections as one year's volunteers are appointed to a dockyard as soon as their military training is ended. The Commanders of the naval stations decide as to the admissibility of any further possible promotion for them.

The Training of the One Year's Service Volunteers in the Seamen Artillery Divisions.

1. The Commanders of the seamen artillery divisions have so to direct the training of the one year's volunteers that petty officers and Officers may be gained for the unattached list, who may be usefully employed as artillerymen in the defence of the harbour fortifications and in laying mines

2. Those one year's volunteers who justify the supposition that they will obtain the qualification for Reserve Officers may be promoted after six months' service to seaman gunner. As far as practicable their further training for Reserve Officers is placed in the hands of specially appointed Officers.

3. Before the expiry of their year of service these one year's volunteers are examined theoretically and practically by a Board in the general duties of the rank and calling of an Officer, as well as in the knowledge and capability required for a Subaltern Officer of the seamen artillery.

4. Those who pass the examination are promoted to petty officers, and if suitable as regards their general education, are granted a certificate of qualification as Reserve Sub-Lieutenant of the seamen artillery by the Commander of the seamen artillery division, and discharged.

5. Any further modifications are made by the Inspectors of seamen artillery.

THE THREE AND FOUR YEARS' VOLUNTEERS.

1. Men of the seafaring population can at any time be entered in the seamen divisions as three years' volunteers. Men of the country population can only be entered as musicians or in the Paymaster branch as three years' volunteers at any time.

Entry of four years' volunteers takes place annually in the seamen divisions on the 1st February and 1st October. Any man wishing to enter as a four years' volunteer must apply by letter to the Commander of the 1st seamen division at Kiel or the 2nd division at Wilhelmshaven and enclose :—

- (a.) A short account of his life.
- (b.) A notification paper, stating that he wishes to do a four years' period of service.
- (c.) All school, education, and other certificates he may have.

If he has the opportunity, he should report himself personally at the above-named headquarters with the papers just mentioned.

The active period of service of the four years' volunteers begins to reckon from the day of their actual entry into the Service, not from the day of their acceptance. They also remain only three instead of four years in the Reserve.

2. In the workmen divisions three years' volunteers can be entered for the engine-room artificers, stokers, artizans, or writers branch.

For a man to be placed in one of the engine-room sections as a three years' volunteer he must be in possession of either :—

- (a.) A second class certificate as engineer in German ocean-going steamer; or,
- (b.) First or second class certificates of proficiency from certain technical schools, together with good certificates of having done over one year's practical apprenticeship in an engine

building factory and over a year's service as engineer or assistant engineer with an engine in work, or over two years' practical and successful employment in works for building ships' or other engines ; or,

- (c.) He must pass an entrance examination which comprises, expressing his ideas on paper or verbally in fairly good German : arithmetic, decimal fractions, solving simple equations ; a knowledge of planimetry and a certain amount of proficiency in sketching objects. He must also produce a certificate of capability as third class engineer in German ocean steamers, or of over one year's active employment as engineer or assistant-engineer on steamers or engines in work, and besides that, at least one year's practical work in an engine factory, or over two years' practical and successful employment in a ships' or other engine building establishment.

3. The men coming under the heading of 2, *a*, if their conduct is good and their military training satisfactory, may have their service period shortened to a year, and those under 2, *b*, to two years under like conditions. The Commander of the naval station decides this.

4. Entries take place annually on 1st February, but exceptionally at any time. Notices of entry are to be sent to the headquarters of the workmen divisions at Kiel or Wilhelmshaven, and the applicants have to send in their certificates by letter or bring them personally.

THE TRAINING OF THE SEAMAN PERSONNEL IN THE GERMAN NAVY.

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Translated, by permission, [from the "Marine-Rundschau," by
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I. *Introduction.*

THE manner of training the naval personnel—Officers included—has been subject to many changes, since our Navy received a more lively impulse by the formation of the North German Alliance. This is most clearly noticeable in that part which I would designate preparatory training, that is, in the education of the Cadets, Midshipmen, ships' boys, and the sailors who serve voluntarily for four years. In the further training which follows after the termination of this preparatory schooling for the different branches of the Service, and in making whole ships' companies thoroughly efficient, the gradual change is not less, indeed, but yet not so noticeable in its variations. This change in the manner of training is, however, not due to blindly groping about in the dark. In the same way that the introduction of armour, and in connection therewith heavy armour-piercing guns, then the invention of torpedoes, torpedo-boats and torpedo-armament in ships, has brought about a complete revolution in the art of building ships-of-war, so these innovations naturally had as result another method of fighting, and consequently a new method of training the personnel. But another sort of seamanship also developed therefrom, the more the use of sails as the motive power of ships dropped into the background.

The transition to ships without rigging, which is now on the point of being completed, forms as far as can be foreseen, that is to say if some new invention does not demand a fresh change, the termination of the process of change which has been going on in all that concerns men-of-war since the introduction of armour-plating and torpedoes.

The modern ironclad, the fast cruiser without masts and yards, and the torpedo-boat, those are the types of ships according to which we must frame the training of our personnel for the future, that is to say, as soon as we have no more ships with masts and yards.

II. *The Preparatory Training of the Personnel.*

As duty aloft—rendered necessary by our stock of masted ships for foreign service—must still for a number of years be taken into consideration in training, we cannot altogether let instruction in it drop in what I have designated above, preparatory training. We are, how-

ever, as cannot otherwise be expected in such a stage of transition, apparently not quite clear how far to proceed with it. We have gone to work most radically with the four years' service men. The change, from the training squadron consisting of full-rigged frigates to the evolutionary squadron composed of unrigged ironclads makes a complete break in the principle followed hitherto.

In the education of Cadets, the five months in the training ship for naval Cadets forms the remainder of old-fashioned education in seamanship; in the Naval School also, and in the examination, the theory of seamanship is required as formerly.

We have gone to work most conservatively in the training of boys, that is, the bringing up of petty officers. Out of three years of training, they pass two in ships with masts and yards, over one year of which is abroad.

At first sight there appears to be something inconsistent in this diversity. If, however, from the present manner of training the four years' service men, we draw the necessary conclusions for the method of manning the ships, the graduation of the different categories seems to me to be thoroughly justified. The more the purely seamanship part of the training of the four years' men remains in the background, the less seldom will they choose seafaring as their vocation in life at the expiration of their period of service. The Reserve which they form will therefore always be the first to be got at in case of mobilization. They must consequently form the bulk of the crews of the ships to be commissioned: the ironclads, the fast mastless cruisers, the despatch vessels. What is then more natural than that they should pass their period of service in time of peace where they will be employed in war; therefore that training for them aloft should be dropped altogether? As long as we employ ships with masts and yards on foreign stations, the present method of training itself forbids us to send four years' service men on board them in large numbers, and so it results that also in peace-time the crews of the ships are divided according to the categories of the supply; four years' men in ships without rigging, men of the seaman levy in the masted cruisers abroad, twelve years' service men divided among both classes of ships.

Such a division certainly cannot be carried out quite strictly. A numerical equalization will always be necessary; the ships without rigging must not entirely be left without seamen by profession, who are after all the best element for every ship's company. But from my point of view, the mode of manning ships proposed here is not only the necessary consequence of the doing away with the training squadron, but in it lies the primary justification for the present manner of training the four years' service men, for there is no further use for them in a rigged ship.

The case is different as regards the training of Cadets and twelve years' service men. As long as we have ships with masts and yards, both must be capable later on of doing duty in them as Officers or petty officers. This forms the standard then of what they have to learn.

The demands that are made in the present day on the knowledge of naval Officers are so manifold that we cannot of necessity let seamanship of an old-fashioned sort (if I may make use of this expression), take up too much space in the training of Cadets, in order that other important branches of service shall not suffer. But perhaps we have gone a little too far in this direction. According to the present system of training, a generation of young Officers will soon have grown up who have never seen a sail since they left the "Niobe." Shall we be able to trust them to keep watch in a ship with masts and yards? Or will masts and yards have already disappeared in all ships, in the year 1892 when the first batch of young Officers thus trained comes to the front? But also in another direction do I see drawbacks in the present method. While formerly every Midshipman made a two years' foreign trip, the young men do not now go beyond a few Mediterranean ports. I would not underrate what they lose hereby in sailor-like knowledge of the world. If one can, in case of necessity, learn everything about seamanship without having ever even gone out of the North and Baltic seas, still no one would recommend such sort of bringing up. It would, apart from other drawbacks, certainly exercise a narrowing influence on the spirit of the body of Officers. If a Sub-Lieutenant, who has finished with the Naval School, and a boy meet on board the "Mars," the latter is the more travelled man of the two. With the present number of ships on foreign stations, the opportunity no doubt offers for the young Officer to make up for what the Cadet has missed. But with the growth of the list of Officers the circumstances will change, the times also are coming when with the increased number of Lieutenants, older in years as compared to formerly and often married men also, going to sea will quite naturally be looked on as a necessary evil. We should therefore exactly in early years, when the mind is more susceptible to all influences, bring further to the front this, so to speak, romantic side of our profession. The advantage to the purely professional development of the young Officer, as well as to that of his mind and character, will not fail to be forthcoming with proper guidance. Whether the evil here laid bare is to be remedied by prolonging the Cadets' cruise, or by shipment for one year on board a training ship for Midshipmen, before appointment to an ironclad, I will leave undecided.

In the training of ships' boys we have left everything up to the present as it was before, and that certainly with reason. The limits of time of the training, that is its duration, are laid down. The youngsters on their entry into the seamen divisions must be so developed in body that they can satisfy all demands of the Service. They must be entered at the age when they themselves or their parents for them decide on the choice of a profession. This gives an average age of 19 on appointment as seaman, one of 16 on entry, and therefore about a three years' training time.

The training aloft fills up this time very well; sail drill is a healthy exercise promoting courage and determination. Life in a sailing ship is conducive to the bodily development of the young men; the journey to foreign lands brings to many of them the fulfilment of

their boyish dreams. In this way we shall soonest succeed in educating the twelve years' service sailors to be a supply for our body of petty officers, who enter the seamen divisions sound in body and mind, filled with inclination and love for their profession, and with a good foundation of discipline and naval knowledge. And that is after all everything one can reasonably expect. I would consider it a mistake to drop sail drill and to fill up the time with premature gun drill and other duty of the modern man-o'-war, or even to distribute the youngsters in their last year among the ironclads. Even admitted that it is a roundabout way to educate a "modern" man-o'-war's man by sail drill, if the roundabout way offers me, otherwise, advantages, if I have also time to attain my object by it, why should not I adopt it? Moreover, a certain degree of training aloft is necessary at first for the twelve years' men.

We must herewith be warned against one thing. We must not think that in the twelve years' man just transferred to the seamen division we have a finished man-o'-war's man; and one makes a still greater mistake in bringing up the boys with this idea. The longer it lasts now, as against the altered circumstances of promotion of former days, till the young twelve years' service men are promoted to be petty officers, the more important it is to impress upon them that with their entry into the seamen divisions their training time is certainly over, but that they have yet a great deal to learn before they are finished man-o'-war's men. The great care bestowed on the education of the youngsters, their, on the average, great intelligence, permits their knowledge to reach a certain pitch it is true; however their capability does not always keep pace with it. With many this is due to a want of physical power; on the other hand, a simple arithmetical example—to mention one branch of duty only—shows that during the one and a half year's cruise, with perhaps about 190 days at sea, not 150 boys can be thoroughly trained in steering a ship under sail and under steam. I should doubt, therefore, whether it be right to make a part of the boys at once leading seamen, or at least, I would only consider it right in quite a few exceptional cases. Carefully led, these young sailors will, for the most part, succeed well; and I would recommend keeping back as large a number of them yearly as possible. If their promotion to the higher grades is delayed thereby, for the above-named reasons it does less harm than if they are too soon put into positions to which they are not equal. I would only just allude here as to whether the introduction of certain increases of pay for length of service is not to be recommended, to make the delay less felt and not to keep the good elements of their career possibly too remote. For the present, promotion is perhaps still good enough for us to lay this on one side. But perhaps even now, in place of promotion to leading seaman, the grant of leading seaman's pay to a number of boys of each year, after their entry into the seamen divisions, might be recommended. Before I leave the theme of the preparatory training of our personnel, I should like to go back once more to the four years' men.

When the supply of recruits from seafaring men was no longer able

to cover the want of sailors, we proceeded to bring in people from the country population, and as we reckoned on a year in the necessary seamanship training school for learning duty aloft, we added a fourth year of service. Now I do not see why, with the discontinuance of training aloft, the fourth year of service should not also be dropped. So far as I know, we are even now bordering on difficulties in covering our want of four years' volunteers of the wished-for quality. But the want of men in the Navy is numerically so small, as compared to the Army, that it ought not to be difficult to draw them from the recruit supply of the country population. I thoroughly believe that with a right conception of the qualifications for selection in the levy of these people (who as far as practicable, should be drawn from the coast provinces, in order to facilitate quicker calling out for mobilization) we should get in them better material than in the four years' volunteers. What the sailor has to learn nowadays for service on board an ironclad is not so much that a man taken from the country population, who brings with him an average degree of intelligence and bodily capability, could not familiarize himself with it in three years. He must learn to adapt himself to ship life, serve a gun, and row a boat. Is so much time necessary for this? To this must be added that on every ship there will still be at hand a number of men from the supply of sailors by profession, and with the growing number of twelve years' men, and their longer continuation in the rating of seamen, an increasing number of this category of the crew. We must further consider that only a portion of the men being shipped each year consist of recruits, and that the others are already serving their second and third years, so that on the whole the crew will certainly be equal to the working of the ship.

Our engine-room personnel forms a proof of the possibility of carrying out my proposal. The most important functions fall to its share on board a modern man-o'-war; it is only recruited to a very small extent from among stokers of ocean steamers, that is to say, from already partly-trained personnel, and yet no one to my knowledge has declared that its period of service is insufficient and demanded an extension. That the results must be better with an extension of the period of service in all branches, must naturally always remain correct, but what I maintain is only that the bulk of our men-o'-war's men have no more to learn, therefore do not require a longer period of service, than people of other branches on board a man-o'-war, who are also drawn from the country population and are without previous training in their duty. For, that the term of apprenticeship as black- or lock-smith is a preparatory training for work in the boiler or the engines of a modern ship, applies only in a very partial way and to single individuals.

The duty on board a modern man-o'-war will divide itself more into the functions of a number of specialists, and the work rendered by the remainder of the crew, for which a particular training is only necessary to a lesser degree. Also the rest of the seamanship that is required from the lower personnel, and in which I would count steering the ship, heaving the lead, certain boat duties, &c., will

become a speciality. This is already the case in merchant-ships; the remainder are workmen, who as in every sort of work, certainly pick up a number of knacks and acquirements, but who are not sailors in the former sense of the word.

In this manner I contemplate filling up our want of men from the country population and believe that for this purpose we shall get more suitable material by means of conscription than by voluntary entry. It is true that our supply of four years' volunteers only barely covers the want, so I see besides in what I have proposed, the only means for the undoubtedly necessary increase of our present strength.

III. *Service in the Seamen Divisions, and the Influence of these Divisions on the Seamanlike Training of the Personnel.*

Of the categories of the personnel treated of up to now, only the four years' volunteers belong from the beginning to the seamen divisions. With the training of the cadets, who it is true, belong to the establishment of No. 1 Seamen Division, this part of the Navy has little or nothing to do; the twelve years' men are only assigned to the divisions at the close of their training period.

But when we leave the chapter on preparatory training to pass on to the training of our seaman personnel in its entirety, we must first of all keep in view the service in the seamen divisions. It is true most of the subjects of training are connected with duty on board, therefore lie outside the scope of duty in the divisions; but also those branches of duty are prepared for ashore, and furthermore the threads of the complete training concentrate in the seamen divisions.

The divisions have to look out for the timely appointment of each man for training, even when they do not undertake it themselves. They must always keep the reservoir full from which the ships draw their seamen personnel in sufficient quality and quantity. The ships then take over the further work, the kneading together of the ship's company into a body complete in itself.

It is well worth our while to dwell a little longer here in order that we may figure to ourselves how extensive and many-sided is the task allotted to the seamen divisions.

The divisions are composed of different elements from the very manner of the supply. Three years' and four years' service men after their entry into the Service have first to receive their infantry training, alike for both; but even in this recruit stage the non-seagoing people are separated from the remainder of the levy by instruction in seamanship, knotting and splicing. In first appointment on board, quite different aspects determine the distribution of the two categories. Finally, the twelve years' men first go to the divisions when their preparatory training as regards infantry, artillery, and seamanship is over. But for them other difficulties at once arise at the divisions. These future petty officers choose the branch of the Service in which they hope to rise (gunnery, navigation, boatswain's, ship's police, or ship steward's line), and it is the task of the divi-

sions to pass each man through the different stages of these branches of the Service. It is a case here, therefore, of timely ordering to the different drill and training courses afloat and ashore, adjustment of sea-time qualifications, settlement of circumstances connected with seniority and so forth. But, moreover, the recruits from the three and four years' service men also compete in these training stages. Further, the training courses on board the gunnery ship for captains of guns, guns' crews, marksmen for revolver-cannon, courses for stretcher bearers and for hands for the signal stations, have to be arranged in good time, and finally personnel for newly commissioning ships has continuously to be provided, while that of the ships permanently in commission has to be relieved and kept complete. Thus in the seamen divisions, without their being divided into special companies, the most varied kinds of training go on alongside each other. Each branch regulates different requirements in respect to training, appointments, promotion in the different ranks. Also, in what forms the bulk of the sailors, each different class of the levy requires a different sort of education, each year another training and distribution for service on board. And yet all these parts must form a uniformly conducted whole. The task set the seamen divisions³ briefly described here, is forsooth no light one and it is not made easier by the fact that the divisions have the training only partially in their own hands; as regards the rest they are required to work in connection with the gunnery ship, the different training schools and ship commands. The difficulties increase as soon as the personnel becomes scarce owing to numerous commissionings.

Rules exist for the training of all branches and for promotion in them, also for the regulation of the course on board the gunnery ship. The change from service on shore to that afloat is prepared for by the establishment of the reserve divisions, by distribution into skeleton crews and drills with them. In short, both the training process of the personnel of the seamen divisions, as well as the preparations for putting together whole ships' companies, are well thought out and in spite of all hardly to be avoided complications, are yet sufficient for the requirements of the Service; but—and here I come to the big, in my opinion not nearly enough emphasized, “but”—the want of personnel has never allowed us to test how our method of training really works under normal circumstances. The appointment of men for service afloat, for training in the gunnery ship, the selection and further training of individuals for the different branches of Service, the adjustment of sea time and promotion, can only partly take place in the manner that should be wished for in the interests of the Service as well as of the individuals themselves.

Regulations which rightly carried out would do good, cannot develop their efficacy because the men are wanting. Thus it happens that we have not yet come to any definite decision on systems that have existed for years (as, for example, the Reserve divisions and the skeleton crews) and only when normal circumstances have reigned for a number of years shall we be able to say if we are on the right road with our method of training.

The circumstances are similar as regards the establishment of naval Officers. For years past it has not been sufficient for the proper officering of ships in commission; we must not even mention shore appointments. To this must be added that where the requirements are continuously too heavy, the power of resistance, and consequently the capability of the individual as of the whole, must decrease. Among the men who only serve a short time this is of course less conspicuous. Outside the advantages that an increase of the establishment of Officers would bring with it to the whole working of the Service, and therefore to the capability of the Navy in war and peace, I can only but point out that it is wise economy to add to the number of salaries in order to save in pensions. The question whether our establishment of naval Officers, Reserve Officers included, is numerically sufficient to officer the ships to be commissioned for a war, I leave quite on one side here. But it is quite clear that the millions paid away by us for shipbuilding are of no use if we save the thousands that are necessary to ensure us the personnel for manning the ships.

The first task of the future will therefore be to remedy the want of personnel. It is true that an increase in the establishment of the personnel has already been in progress for a number of years, but the increased demands of foreign and home service have absorbed what it has given us; a real improvement has not taken place. Therefore, a change must be brought about here if a lasting damage to the interests of the Service is not to be the result.

But while as regards the men, as we have the material at hand, the increase of the present strength is more a question of State, it remains to be considered as regards the Officers, and to a certain extent also as regards the petty officers, that these bodies cannot be increased at will in a couple of days. Therefore, in my opinion, it only remains for us as a preliminary measure to take a step backwards in commissioning ships; and first and foremost indeed the summer commissionings in home waters—leaving the ships necessary for training purposes in commission—will have to be reduced, that is, the squadrons will have to be made smaller.

But if we stick fast to the prescribed standard as regards the *number* of ships to be commissioned, I should like to try and point out in what follows, that a shortening of the *duration* of time in commission of these ships is not only possible but even to a certain extent desirable. The damaging results of the want of personnel would then at least be limited in the duration of its influence and would be thereby less felt. To lay bare my views on this subject I must follow the progress of training a step further and contemplate the working up to a state of efficiency of whole ships' companies.

IV. *The Working up to an Efficient State of Ships' Crews.*

The conditions of war must serve us as a guide for the path to be taken in rendering whole ships' companies thoroughly acquainted

with their work. The characteristic side of our mobilization will consist in this, that with the first few days of mobilization entirely new connections will be formed, for the ships already in commission that are suitable for war will also have to be manned in a different way to that in time of peace. The personnel that will be set free by placing the training ships out of commission, the Reserve men coming in, will render a new distribution from [the base upwards necessary. Whether there will remain time to make sure of readiness for war in the usual way, whether exercises by single ships and squadron-mancœuvres will be able to take place, depends entirely on the progress of events. It might be necessary under certain circumstances to form the ships whose fitting out is only just completed, into a squadron, and send it direct against the enemy.

Now our personnel will be best adapted to accustom itself quickly to new associations, the newly commissioned ships will be most quickly ready for war, if the individual training is completed as far as practicable *before* commissioning the ships. The gunnery ship (if one is enough) must therefore supply captains of guns, and marksmen for revolver-cannon, trained and *in practice*, both for the short peace mobilizations as well as for those in the event of war, likewise guns' crews who have received their preparatory training. The Reserve divisions must look out for a sufficient number of skeleton crews, and the men told off to the different ships must be drilled with their skeleton crews; if the Captains and Officers told off, take part in the cruises (to be increased) of the Reserve ships¹ in which the skeleton crews are borne, evolutions by single ships may be dispensed with while the squadron is formed. The parts of a crew thus already prepared will weld themselves into a complete unit more rapidly and permit of the training on board the ships being done considerably quicker. To cite one branch of duty only, such a prolonged exercising at the guns (drill, target-practice, practice under service conditions) will not be necessary, as the men will come on board with a better preparatory training in gunnery. Gun drill will rather serve as giving a guarantee that the whole gunnery system acts, as well as the method of passing orders and controlling the fire, than that its task shall be to form a gunnery training for the crew. In this manner we shall succeed in bringing our peace training nearer to the conditions of war. The attempt must teach us how far such a quickening in the time of training on board, that is, a closer approach to the conditions of war, is practicable. It is only an approach after all; it would be unreasonable, because under some circumstances ships have to be sent against the enemy eight days after commissioning, to make this period the basis of our whole peace training. But it seems to me just as wrong to set apart months in peace, as a training period for which in war perhaps only days may be at disposal,

¹ The Reserve ships in the German Navy are divided into groups of four. One of these only is manned, and in case of war or mobilization, its crew is divided so as to form skeleton or nucleus crews for all four ships of the group, which are filled up with Reserve men. This crew is occasionally exercised on the other three ships of the group.

and thereby to cut down in time and personnel the courses in the training ships, the drills of the Reserve divisions and of the skeleton crews, &c., in short, all the preparations for training under service conditions. The preparation for war, on which, however, our whole activity in peace should be directed, is not served thereby. The more we introduce a system of training, which shall impart to the men as large a portion as possible of what has to be learnt, before commissioning, the nearer we shall bring ourselves to the conditions of active service and the quicker will our ships be ready for war after mobilization. I have already pointed out above that by these shorter summer mobilizations of a portion of the ships, the disadvantages of the want of personnel can at least be somewhat remedied. They must not cease however, even when our effective personnel has reached the desired strength, but must be considered as normal for a portion the ships commissioned each summer, out of regard to training under service conditions. They are the test to the problem for the Reserve divisions, the skeleton crews, the gunnery and torpedo ships. But they are insufficient for two purposes; for the education of recruits from the country population and for thorough squadron training. For the education of the last entered yearly batches of men not sailors by profession, be they four years' volunteers or men bound to serve, the evolutionary squadron must remain permanently in commission. In it besides, is the place where the tradition of squadron duties is fostered; this squadron also forms the manœuvre school of the fleet. With a rightly directed change of personnel both kinds of commissions, the permanent and the short ones as for war, will act as supplement the one to the other, and thus we shall succeed in forming squadrons capable of manœuvring, out of the ships commissioned only for a short time for exercise as in war. Thus towards the end of the summer we shall have the opportunity given us for drills on a larger scale, with a manœuvre fleet; as far as tactical training, education of leaders, the solving of tactical and strategical questions demand it. Beyond that, a too early formation of larger combinations will have to be avoided.

V.—*Conclusion.*

I am quite aware that I have not said much that is new in the above, about Reserve divisions, skeleton crews, &c., for their very existence alone, shows that we had already in view this manner of training, aiming at quick preparation for service in case of war. It only concerned me to bring back their signification into the right light, which owing to the want of personnel has not been viewed properly. The chosen theme is besides so comprehensive and many-sided that one is bound to set a limit to one's treatment of it. I could therefore only slightly allude to much that was well worth going into more closely, as for example, the training to be conducted according to quite different points of view, on board the ships on foreign stations.

But there is one thing that I should like to refer to briefly in conclusion, that is, the torpedo divisions. In them is already carried

out for the most part what I should like to obtain for the seamen divisions, namely, an education for all departments of service on board, entirely aiming at quick preparation for war, by the help of drill vessels and Reserve divisions. The conditions are more favourable here, in as far as the whole personnel destined for manning the boats is united in these divisions. Applied to big ships, this would mean the uniting of the seamen and workmen divisions into one body, which is impracticable. This organization of the torpedo divisions was established in the first instance by the particular care which the handling of the torpedoes themselves, as well as the torpedo boats require, and which therefore made it apparent that an undivided training of the personnel was necessary before commissioning. Furthermore it is to be ascribed to the circumstance that the torpedo branch has always understood how to aim its efforts directly for war, and to model all conditions accordingly. If we copy it in this respect, by a similar manner of training, it can only be for the benefit of the whole.

The careful preparatory training of the personnel before the commissioning of the ships on board which it has to fight, is a laborious and unostentatious task, its results do not strike the eye so much as cruising about with squadrons, but its fruits will not be wanting. If we have a personnel of Officers and men thus carefully trained for war, we can engage in the strife with a justified self-confidence which is a chief factor in every successful result. This self-confidence should guard us then from the fault of weighing with a too anxiously critical eye, our matériel in ships against that of our opponent, and of seeing the certainty of victory for him in every inch of armour and in every knot of speed in which his ships are superior to ours. For the thought is still true to-day which a former head of the Admiralty clothed short and to the point in the words:—

“Ships do not fight, but men do.”

PRÉCIS OF THE REGIMENTAL HISTORY OF THE 33RD EAST PRUSSIAN FUSILIERS IN THE WAR OF 1870-71.

Compiled by Major G. F. R. HENDERSON, the York and Lancaster
Regiment.

IN the summer of 1870 the 33rd Fusiliers, although recruited from a distant province, formed part of the garrison of Cologne.

At the beginning of July the political horizon was clear. But early in the month the papers reported that the Spanish Cortes had determined to elect Prince Leopold of Hohenzollern as their King. This news aroused no special interest in Prussia, but was received with the liveliest astonishment in France, and the accession of a German Prince to the throne of Spain was adroitly turned into a national question. In a few days it became manifest that France was intent on war. On the 14th Napoleon's Government called out the Reserves.

The Prussian order for mobilization was issued by telegram on the night of the 15th, and reached the 33rd at midday on the 16th, accompanied by explicit instructions not to hurry, but to adhere exactly to the directions already given out. On July 19th the French declaration of war was delivered in Berlin.

The Ersatz battalion of the 33rd was formed on the 16th, and at the same time the names of those who were to march to the front were published.

On the 17th the Officers detailed to bring in the reserves left for East Prussia, and the regiment, together with civilian working-parties, was employed clearing the glacis of the fortress.

The 33rd belonged to the 29th Brigade, 16th Division, VIIIth Army Corps. The Corps Commander, being appointed Governor of the Rhineland, was succeeded by General v. Goeben, hitherto commanding the 13th Division, VIIth Army Corps.

The regimental Commander was appointed to the 3rd Landwehr Brigade and Lieutenant-Colonel Henning was transferred from the 40th Fusiliers to take his place. The latter was an old 33rd man, and had only left the regiment five years previously. The last days of July were spent in hard work completing the process of mobilization. This required more time than with the Rhenish regiments, for the reserves had to come from the far east of Prussia.

The three battalions took the field with 5 commissioned Officers to each of the 12 companies. Of these, 14 belonged either to the Reserve or Landwehr, and 13 were Officer-aspirants, just promoted to Second Lieutenant.

During the evening of July 28th the last complement of reserves

arrived. On the next day the whole regiment was equipped and ready for service. On the 30th the three battalions were exercised at rifle practice under Lieutenant-Colonel v. Henning.

On Sunday, the 31st, at 7 A.M., the regiment left Cologne to join the 1st Army, under v. Steinmetz. The first move was by steamboat, seven of these being provided by the Cologne-Düsseldorf Company for the transport of the troops.

After a six hours' voyage the battalions landed at Boppard and St. Goar. The 1st and 2nd battalions were unable to obtain carts for the carriage of their baggage. The 3rd was more fortunate.

Orders were received that the regiment should make all haste to the front, and during the next three days, although the heat was intense and the country hilly, 67 miles were traversed. The length of the march is the more extraordinary when it is remembered that, of the 3,000 Fusiliers, 800 had only arrived in Cologne at midday on the 28th, after having travelled, without stopping, from East Prussia, closely packed in railway carriages in the heat of a July day. The uniform, also, to which they were unaccustomed, the new boots, and the heavy kit that the majority had to carry, were all against them. But during the first march carts were requisitioned to carry the packs of the 1st and 2nd Battalions. On the 1st August a start was made at 5 o'clock, but the heat had increased and a halt of some hours was made at noon. Although the old men and boys still left in the district volunteered to carry the rifles of the most exhausted men, the second day's march made itself severely felt. The new boots were painful to feet unaccustomed to marching, and, consequently, many became footsore.

Early on the 3rd of August the Fusiliers joined the 15th Division at Wadern, and the fear of being too late was past.

On the 4th of August the regimental state showed 67 Officers and 2,943 men. 90 footsore men were sent to guard the supply depôt at Neunkirchen.

Orders were now received from v. Steinmetz as to marching and quarters. These were very stringent as to order and discipline on the march, the payment of hired vehicles, and the distribution of these in several échelons.

On the same day the news of the combat of Saarbrücken was received.

On the 6th of August began the movement of the 1st German Army to the Saar. About 9 A.M. the regiment left its quarters, and at midday took up cantonments for the night. Towards evening the sound of cannonading was heard near Saarbrücken. The excitement was intense, but no orders were given to advance. The 15th Division had no share in the victory of Spicheren.

Next day, starting at 6 A.M., the Fusiliers arrived at Saarbrücken, within 3 miles of the battle-field, after a hot and exhausting march. It was impossible to get a regular supply of rations. The unexpected rencontre with the enemy had upset all arrangements. A few sacks of meal were procured from a neighbouring mill, and the men dined on gruel.

At 7 P.M. divine service was held, and very soon afterwards news came in of the victory of Woerth.

The following day, owing to the countermanding of the orders of v. Steinmetz by v. Moltke, the forward march of the 15th Division, which had already commenced, was countermanded, and the regiment was ordered to occupy the Spicheren heights, passing over the field still strewn with corpses, and making its bivouac in the abandoned camp of a French division. Provisions were scanty, consisting merely of bacon and biscuit. This bivouac was maintained until the 12th of August. The Germans had been prevented from pursuing the French after the battle of Spicheren, in consequence of the scattered condition of the various army corps, and it was not until the 10th that information was obtained by the cavalry that the French had definitely fallen back to the French Nied.

As a clue to certain incidents in the after history of the regiment, the general instructions issued by v. Steinmetz are worth recording. "When and wherever we meet our enemy he must be attacked with the greatest vigour. It is a principle of long standing that the cavalry should attack first. The excuse for doing nothing that no orders have been given will never hold good, so long as firing can be heard; every body of troops should march in that direction, and as soon as they are on the battle-field ascertain how the battle is going, in order to be able to join in it in the most effective manner. By using great energy great results may be won and peace secured."

On the same day, Colonel v. Henning introduced to the Officers two Englishmen. These were Major Roberts, late Captain in the English Army and now correspondent of the "Daily Telegraph," and the Hon. Allanson Winn. Both gentlemen asked and were granted permission to accompany the regiment during the next few days, and one of the battalion Commanders undertook to provide for their accommodation as far as the necessities of war allowed.

The provisioning of the troops, when once order had been restored and the 1st Army was able to fix the halting-places for its own divisions, had become regular and plentiful. The supply dépôt at Saarlouis was well stocked and provided everything. The iron ration, which had already been attacked, was renewed. The superior Officers paid the greatest attention to the commissariat, and never allowed the slightest infringement of the rule that the iron ration should only be resorted to in case of extreme necessity.

The Commander of the division added the following instructions:—"Let the men bear in mind that it is a stern duty to bid defiance to deprivations, sometimes more difficult than facing the enemy. The honour of our standard must be maintained by strict obedience on the one hand and on the other by the unwearied attention of the Officers to the needs of the troops."

On the 12th, the division moved forward. The regiment had still 1 Officer and 63 men on the sick-list.

On the 13th the march was continued in the direction of Metz, and on the afternoon of the 14th the thunder of the cannon was distinctly heard in the bivouac. It was the battle of Colombey, the second

fought by the Ist Army, and again the division took no share in the engagement. After the battle the French retreated through Metz. The IInd Army crossed the Moselle below the fortress in order to strike the enemy in flank as he retreated on Verdun, whilst the Ist Army observed the fortress and secured the right flank of the IInd.

In order to carry out this latter duty, the VIIIth Corps was ordered to cross the Moselle. On the 16th, the division reached the river at an early hour, and was obliged to make a long halt of several hours' duration, although the roar of cannon on the other bank told that a battle was in progress. But the IXth Corps, belonging to the IInd Army, still standing on the left bank of the river, had been ordered to cross by the pontoon bridge at this spot, and had to be allowed to go first. The 16th Division had reached the river and crossed before the IXth Corps arrived, but the 15th had to encamp in the hot August sun in a place where there was no shade, and within sound and sight of the fighting. Military wit had already christened them the "Ironsides."

On the 17th, the river was passed, and the regiment bivouacked at Gorze, prepared to take part in the attack on the French, who had withdrawn again to Metz. It was impossible to procure rations in Gorze, and the remains of the iron ration, already severely tried, provided a very scanty meal.

No time was lost in marching off the next morning, for breakfast there was none. A party was sent to bring up a fresh supply of ammunition, as the packets carried by the men, owing to the rain and damp bivouacs, seemed unserviceable. At the same time, a strong escort was detailed to accompany the Paymaster while requisitioning supplies, and to protect the transport.

The division marched at 6 o'clock on the 18th through the Gorze defile, the regiment at the head of the main body. The bloodstained field of the 16th was an impressive sight.

On the other side of the Maison Blanche the march turned off from the Rezonville road into the open country, where the battalions deployed from column of route into columns of attack. West of Rezonville the main body crossed the high road from Verdun to Metz, in the direction of Villers-aux-Bois, while the 28th Regiment, forming the advanced guard, moved further to the east in the direction of Bagneux. The advanced guard suffered some loss on its entrance into the Bois-de-la-Jurée from the musketry fire of the enemy in the Bois-des-Genivaux. Without hearing anything of this preliminary firing, the rest of the division reached the other side of the Bois-de-la-Jurée without loss, and quite unaware of the close vicinity of the enemy, who was hidden from them by the wood.

At 8.30 the division, south of Villers, changed front to the right, and advanced in an easterly direction in line of regimental columns with colours flying. The 33rd was on the right wing. A halt was made. Arms were piled, and the men rested without taking off their packs. The heat was intense, and there was no shade. Fresh ammunition arrived, and was distributed. Owing to the great heat, thirst had become almost unbearable, and the wish to procure water

from a neighbouring farm was loudly expressed; but, as orders to march were expected every moment, no attention was paid. However, as orders did not arrive, permission to fetch water was given at 11.30, and parties were sent from each regiment for the purpose. Soon after noon they returned, and at the same time orders arrived to fall in. There was no time to issue all the water. From the north, the sound of the cannon of the IXth Corps could be heard. The battle had begun. The order to load was given. At 12.20 the regiment was ordered to advance in the direction of Gravelotte. The regiment turned to the right-about and wheeled to the left, the 1st battalion acting as pivot, across the Roman road.

According to information received from the cavalry patrols, the village had not been in the enemy's possession in the morning; still it was possible that it might have been occupied unobserved by hostile detachments from the Bois-des-Genivaux. The 3rd battalion led the way, the 9th and 12th companies in front, in company column at deploying interval, the 10th and 11th following as a half-battalion. The 1st and 2nd battalions were led by the regimental Commander to the yard of the Post-office, 1,000 paces east of Gravelotte. The brigade Commander went there at the same time in order to give further instructions.

When the battalions came out from behind the wood, the enemy opened a hot fire from his guns on the height east of Gravelotte, but, owing to the great range, little damage was done; one man only was wounded. In order to escape the fire, the battalion moved along a hollow stretching eastward, the 9th company alone continuing the march across the heights towards Mogador farm. As the battalion neared Gravelotte, the enemy's fire grew more effective.

The 12th company passed through the village and occupied the eastern boundary south of the road; while the 10th company, which had followed up the village street, held the position to the north.

The 9th company was unable to occupy Mogador. The enemy's shells set fire to the farm, and a number of their own wounded were burnt to death. The company drew nearer to the battalion, and the 11th company moved up to fill the gap.

The enemy's infantry, at 1,000 paces range, opened a hot fire on the companies as they advanced, and although erratic it caused some losses.

Meanwhile, the brigade Commander had given Colonel v. Henning instructions to deploy the two other battalions south of the village along the Ars road. But, as hostile patrols were seen on the edge of the Bois-des-Vaux, and the village could not be considered securely occupied so long as the enemy remained in possession of that wood, further orders were given to the battalion to go through the village and secure the outskirts of the wood. The 6th and 7th companies formed the first line; the others remained as a half-battalion at the Post-office. But as the extent of front was too great for two companies, the 8th company was sent up to prolong the line to the right; the 5th followed in reserve.

Under a fierce fire, especially from the mitrailleuse battery at the Point-du-Jour, the company reached the eastern outskirts of the wood with very little loss, taking fifteen prisoners belonging to the 55th of the Line.

The Commanding Officer of the 1st battalion had already received orders to support the advance of the two battalions engaged in front. In accordance with these instructions, he sent the 1st and 2nd companies to the south corner of Gravelotte to support the right wing of the 2nd battalion, and the 3rd and 4th up the high road in support of the 3rd battalion.

This separation of the four companies of the 1st battalion, intended to be only temporary, was the reason that they did not come together again under one command during the whole of the day.

By 1 P.M. the regiment had assumed the following positions:—

The right wing, consisting of the 1st and 2nd companies, had come into line with the 2nd battalion, and occupied the west border of the Bois-des-Vaux.

To the north were the four companies of the 2nd battalion.

On the left-centre were the 10th and 12th companies, in possession of the north-east boundary of Gravelotte village, on both sides of the high road. Still further to the left, in the open field, and écheloned to the front, were the 11th and 9th.

The two latter were assailed by heavy infantry fire from the wood.

As the whole 33rd Regiment was now deployed in a line of company columns, the Brigadier ordered up his other regiment, the 60th, in support. It took post in rear of Gravelotte.

The leader of our 3rd battalion had now two courses open to him: either to draw the 9th and 11th companies out of range into the village and to remain inactive under a hot fire, or to drive the French tirailleurs out of the wood. Naturally,¹ he decided on the latter course, and instructed the companies to unite for a further movement.

After a very brief halt, therefore, in the position they had reached, the companies advanced, with loud cheers and without firing a single shot, directly on the wood. A murderous shower of bullets struck the columns, but failed to check them. The leader of the 9th company was killed, and the senior Lieutenant of the 11th also fell. Two other Subalterns were severely wounded, and the connection between the different parties of the 3rd battalion was entirely broken up, the 12th and half of the 10th companies crossing the Mance valley by the causeway. The enemy's artillery and mitrailleuses showered shell and bullets down on the latter as they crowded together on the narrow road, but the edge of the wood was captured, and the French were driven back across the valley.

Shortly before this action was decided, the leader of the 3rd battalion was mortally wounded. The battalion had suffered very heavy loss in its struggle for the west edge of the wood, and the few unwounded Officers sought to bring the troops into connection with

¹ So in the original.

the rest of the regiment, in order to prepare for an attack on the opposite ridge of the ravine.

The 3rd and 4th companies had followed the 3rd battalion during the first phase of this attack, but had afterwards withdrawn to Graveotte. Their losses were much less than those of the 3rd battalion. A Lieutenant of the 4th company had found room for his zug between the 10th and 11th companies, and had joined in the storming of the wood. He was severely wounded, but his men, under a sergeant, attached themselves to the 11th company.

The companies of the 2nd battalion, together with the 1st and 2nd, had penetrated into the middle of the wood. As they advanced, the troops found movement very difficult; the ground fell considerably, and the thick underwood of twenty-five years' growth made the descent exceedingly arduous. But they soon reached a spot which was free from underwood, and sheltered from the bullets, flying in thousands overhead. The companies rallied in the marshy meadow at the bottom of the valley. Gradually all the men arrived, early or late as they had found a clear or an obstructed passage. As like difficulties confronted them in the ascent from the valley up a heavily timbered slope, the company leaders ordered the packs to be taken off. In the ascent which was now made, all connection between the companies was lost. Some made their way without difficulty, others met with obstacles; the undergrowth was so thick that, in places, the men had to cut their way through it with their sword bayonets, and it was impossible to see what was going on to right or left. The wood stretched for some distance (500—600 yards) up the slope, and the advancing detachments were met by infantry fire. As nothing could be seen, there were uneasy forebodings of what was to come; but, answering to the call of their Officers, the companies pressed through the thickets to the further edge of the wood. Here they rallied as they arrived in succession, with the purpose of issuing from the covert simultaneously. The Metz high road lay before the right at a distance of 1,000 paces. Its ditches were filled by the enemy in great strength. On the far side, shelter trenches had been thrown up. Advanced detachments of French were stationed on the open slopes above the wood, in the great quarry to the right front, and a few were in the gravel-pits. It was the 2nd Division of the 2nd French Corps which confronted them, and against this position the regiment had to advance without any warning.¹

On the right, south of the road, the 1st and 2nd companies moved against the quarry. The 7th was next to them, and then came the 6th. The 8th extended along the edge of the wood, opposite the gravel-pits, which were 300 paces distant, and held by French sharpshooters. When the latter became aware of the near vicinity of the Germans, they opened a fierce fire. The leader of the 8th company sent his senior Lieutenant with his zug to clear the pits. This was easily effected. The 5th company remained in the wood further back as a reserve. The Commanding Officer of the 2nd battalion was now mortally wounded, struck by a couple of shots.

¹ So in the original.

The five companies forming the right wing now endeavoured to push forward from the wood up the open slope, being as yet in ignorance of the existence of the well-covered shooting lines of the French. When the advance came within sight of the enemy's guns, the companies suffered heavy losses, both in dead and wounded. The Commanding Officer of the 1st battalion, although severely hit, remained with his two companies, giving the necessary orders. A Subaltern of the 6th company was wounded, the leader of the 1st struck by three shell splinters, and another Subaltern was killed. The Commanding Officer was supported to a heap of stones, from whence he could survey the battle-field. Seeing that to advance was impracticable, he ordered his two companies to remain where they were until they should be able to push forward, and was then carried to a mill in the Mance valley.

The 7th company had meanwhile moved out on the open slope, and had become detached from the companies of the 1st battalion on its right. The Lieutenant in command had, however, very soon to call a halt. His flank was struck by heavy fire from the quarry; a Subaltern was wounded, and the company was withdrawn to a salient of the wood, about 600 paces from the quarry.

The 6th company, on the left of the 7th, had also advanced with loud cheers to the footpath which leads from the gravel-pits to the quarry. The Captain was killed; his senior Subaltern was mortally wounded at the same moment; a number of men had fallen; the company paused; the larger part, under the now senior Officer, drew back to the wood; a smaller detachment, under another Lieutenant, moved into the gravel-pits, already occupied by a zug of the 8th company. The Captain of the 8th company had posted his remaining züge near the quarry close to the road, and had got touch with the 1st. The 5th was brought up to a hollow situated near the gravel-pits, and the whole assumed, for the present, a defensive attitude.

It was about 2 P.M. Shortly before this, the 3rd battalion, north of the road, had also succeeded in pushing through the Bois-des-Genivaux.

Thus two separate actions, as it were, were carried out by equal portions of the regiment, 1,000 paces apart. The six companies of the 1st and 3rd battalions, forming the left wing, had not rested long after the capture of the outer edge of the wood. The enemy, after relinquishing the west bank of the Mance valley, had re-formed again on the opposite ridge, and had here been heavily reinforced. Their fire began again with its accustomed fierceness. The Captain of the 11th company, which had suffered the heaviest loss, gave permission, on this fresh outbreak, for a renewal of the attack. Just as he placed himself at the head of his men he was killed. The senior Subaltern, bent on carrying out the intention of his superior, pressed forward down to the meadow at the bottom of the valley in order to scale the opposite slope. During this movement another Officer was wounded.

The Subaltern now in charge of the 9th company led his command across the valley on the left of the 11th. He also was killed.

The 10th company had moved towards the wood where the high road cuts through it on its narrow causeway. One zug advanced up the road, directing a heavy fire on the wood on either hand. The company leader was wounded and a Subaltern struck dead. The senior Lieutenant assumed the command, but for a short time only; he was severely wounded, and died afterwards at home in Coblenz. One Officer only was now left with the company, and he had been hit in the head, and was very shortly obliged to retire to the dressing place.

Thus the whole of the Officers of the 10th company were either killed or incapacitated. Many of the senior non-commissioned officers had also fallen, and the men were without a leader. A detachment assembled under a sergeant, who thenceforward acted as their commander.

The 12th company, in connection with the 10th, had also advanced by the road, and reaching the eastern border of the wood, opened a heavy fire on the French infantry retreating in the direction of St. Hubert. The enemy, having lost the edge, drew in all his advanced parties from the wood which he had so obstinately defended.

The 3rd battalion, however, was too exhausted to continue the advance. Portions of the 10th and 11th companies had pressed forward on the left, and with them went men of the 3rd, through the wood towards the open slopes below the Moscow farm; but a fierce cross-fire from the farm and from St. Hubert compelled them to halt. A fusilier of the 3rd company fell in this advance. He was the only son of the Commander of the 15th Division. He had but ten days' service. On the following evening the father laid his only son in a grave, dug with his own hands, whither he was very soon to follow him. The remainder of the 3rd battalion, together with detachments of the 3rd and 4th companies, remained for the present on the ground they had won.

One result of the gallant advance and the driving of the enemy from the wood was that the artillery of the VIIIth Corps was able to advance to the long ridge stretching from Mogador to Gravelotte, and to open a very effective fire upon the hostile position. A zug of the 3rd company, under a Subaltern, was appointed as escort to the batteries.

In the meantime, into the space that intervened between the two widely-separated wings of our regiment companies of the 60th Regiment had been pushed forward. These were followed by the remainder of the division, the 8th Jägers, the 67th and 28th Regiments, who, crossing the valley by the causeway, deployed along the edge of the wood on both sides of the high road, preparatory to a further advance on the farm of St. Hubert, the capture of which was almost secured by the occupation of the position already won. In consequence of the appearance of these reinforcements, crowded together over a very limited space, the different corps were able to communicate with each other without difficulty.

The companies of our fusilier battalion were very closely packed. The 9th and 11th, on the north side of the road; the 10th and 12th

in one of the smaller quarries south of the road. The supply of ammunition was replenished by those coming into the battle, and together the whole force determined to storm the farm, which was about 300 paces distant.

St. Hubert is on the high road, on the north side. Its massive buildings, as well as the high walls surrounding the garden, gave excellent cover to the French (60th Regiment), from which they fired heavily on the defenceless firing line of the mixed detachments of the 15th Division.

This fire became so intolerable that at length the foremost German line, without waiting for orders, rushed forward with loud cheers, and without firing a single shot as they charged. About 3 p.m. the farm was taken, but with tremendous loss. The remnant of the 3rd battalion rushed into the buildings to take their part in securing immediate possession of the post. The prisoners were sent to Gravelotte.

The fight had moved in a northerly direction, so that the detachments to the south of the road, as well as the 4th company, only succeeded in pressing forward in rear of the stormers. The right wing of this attack was compelled, by the heavy fire of the French, to retire again to the quarry.

After the seizure of St. Hubert, there was a pause in the progress of the fight, although there were still a few smaller ventures against the hostile position, amongst which the following is noteworthy:—An under-officer and a fusilier patrolled towards the Point-du-Jour; the terrible fire from the trenches compelled them very soon to seek cover in the roadside ditch; but the fusilier, who was well supplied with cartridges, left his comrade, and crept across the open field a few hundred paces nearer the enemy, and found shelter behind a little knoll. From here he fired upon the team of an ammunition cart, which had just arrived, and from which cartridges were being issued. His shots drove the cart away; and the French fired several volleys against the concealed marksman. His helmet and tunic were riddled, but he did not creep back again until his pouch was empty and his rifle too foul for further use. He was one of the first of the regiment to receive the Iron Cross.

No change had taken place in the situation of the six companies of the extreme right wing, which lay facing the Point-du-Jour. The ceaseless fire from the road was not so severely felt as it had been before, by reason of the cover afforded by the ground, and the companies held their defensive position with little loss.

When the cheers and the fire of the stormers of St. Hubert were heard, it seemed as if the enemy had weakened his force in front of our right wing. This led to a renewal of the attack on the road and the great quarry. But, as soon as the fusiliers showed themselves outside their shelter, the enemy's fire began again with undiminished fierceness, and with the same terribly destructive power which had been so keenly felt during the first attempt to advance up the open slope. The companies fell back, not without loss, and yet without

relinquishing all hope of sooner or later capturing the Point-du-Jour farm, even if it had first to be set on fire by our shells.

All endeavour to advance across the open being abandoned in consequence of the cross-fire of the invisible French infantry, a pause ensued on the right wing also.

Meanwhile, Colonel v. Henning, after watching the advance of the 3rd battalion on St. Hubert, went to the gravel-pits to get information of the six companies on the right wing. On his way he was struck by a spent ball on the foot. The Adjutant accompanied his Colonel, who, after giving orders for the defence of the ground now occupied by the right wing, returned to the 3rd battalion.

Whilst the companies of the 33rd engaged in the assault of St. Hubert were mixed up with the other troops of the division, the six companies on the right had been hitherto without support. About 4 P.M., however, German troops appeared advancing from the edge of the wood near the high road; some of them went along the footpath leading from the valley to the gravel-pits; they were the marksmen of the 39th Regiment.

The Commanding Officer of this regiment, followed by two of his Captains and his Adjutant, came to the gravel-pits in order to ascertain how things were going. Immediately after their arrival one of the Captains was wounded, and hastened back to the wood. The other, Count Stosch, assembled the men of his company, who had followed him into the gravel-pits, with the design of assaulting the French position along the high road. For this undertaking he asked the support of the portion of the 33rd here present. Our Officers, however, were dead against a fresh attack on the high road and the quarry, so long as the enemy could not be shaken; until then they considered the capture of the road beyond the open ground impossible.

Count Stosch, nevertheless, considering this objection unreasonable, attempted an advance with the men of the 39th whom he had at hand. He was almost immediately mortally wounded, and was carried in by his retreating men. Those of his company who were still unwounded remained with the 33rd in the gravel-pits, but here we had again to bewail fresh losses, caused by the fierce fire which broke out anew after the advance just described. Still the position was not unfavourable, for the border of the wood in rear was held by the 39th. Owing to the long range, the needle-gun appeared to have no effect, and the men were obliged to remain inactive.

When the enemy's fire at length ceased, parties were sent out to bring in the severely wounded. Unhappily this charitable office could not be properly performed, for every time a few men showed themselves the fire from the trenches began again.

Many wounded who had lain on the open slope for hours had been hit again and again as they lay there, and many were thus killed.

A welcome interruption to the wearisome inactivity was the breaking out of fire in the buildings of the Point-du-Jour. This had been effected at last by our batteries. The destruction of this strong post gave fresh hopes of victory.

The battle broke out again; south of St. Hubert especially, there was very heavy fighting. A battery endeavoured to come up into line, but had to retire again to the valley, and the heavy fire prevented the advance of the 4th Lancers, whose riderless horses galloped over the slopes in every direction. The position occupied by the 33rd very soon showed its defensive value.

About 5.30 P.M. the enemy suddenly burst out from his entrenchments upon the various groups advanced in front of the German line. The fire of the detachments of the 60th and 39th, which lay in the open east of the Bois-des-Vaux, as well as that of the right wing companies of the 33rd arrested the attack. The French retired back to their trenches with considerable loss.

But an advance made against the mixed detachments of the 15th Division at St. Hubert was more successful. Many of these detachments, being without leaders, retreated to Gravelotte, but, in spite of their defection, the post was maintained. Our six companies held on firmly throughout this critical period, but had expended their ammunition. In order to strengthen the garrison of the farm, the 31st Brigade was ordered up into the firing line.

About 5 o'clock the firing on both sides had again relaxed. But it was evident that great endurance and firmness would be needed to hold the ground which had been won. The opportunity was taken of the cessation of fire to bring in the cartridges from the dead and wounded lying in the open.

The hot sun and the long-sustained effort of the fight caused great exhaustion amongst the men, especially amongst those who had been engaged from the beginning of the action. The time dragged slowly along. It seemed as if the enemy was either wearied out too, or was preparing for a fresh endeavour to recover the ground he had lost.

The leader of the 8th company utilized the pause in the firing in an attempt to gain ground in the direction of the great quarry. A portion of the company was left in reserve at the edge of the wood. The advance was easy enough for some distance, owing to the heaps of stones hewn out of the quarry, which served as successive stages. With the exception of this isolated enterprise, the slopes below the Point-du-Jour looked the same as when the Fusiliers first set foot upon them.

The sun was now sinking beneath the horizon far behind. The flames of the blazing farm of Point-du-Jour mingled with his last rays. The men welcomed the approach of night, rather with a sense of duty well done, than with the glorious feeling of a victory gained.

There was one more outburst of battle, when the French once more advanced from their trenches. Under the sweeping fire of the needle-gun they fell one after another on the bloody fields. But this attempt had a somewhat demoralizing effect on the confused masses of troops which lay on both sides of the wood about St. Hubert.

The wavering of the line was observed by General von Moltke over by Gravelotte, and he called the attention of His Majesty the Commander-in-Chief to the fact. The IInd Army Corps, which had

in the meantime reached Rezonville, was ordered to advance and support the 1st Army.

About 7 P.M. the reinforcements reached the edge of the wood, and moved out on to the open slopes. With joyful surprise the Fusiliers welcomed a company of the 54th Regiment which came to join them, followed by a company of the 2nd Jägers. The high spirits of the new comers soon revived our worn-out men. Our Officers explained the situation, and described the hitherto vain endeavours to storm the Point-du-Jour position. The long and crowded firing line now opened a heavy fire. It was responded to with equal energy. The German drums in rear beat "the advance." Once again the cannon thundered, and the very earth seemed to tremble. The Fusiliers of the right wing left their cover, and hastened to take their place in the slowly advancing shooting line. The battle began again all over the field. The enemy's batteries and chassépôts increased the uproar. Gradually the reinforced German lines gained ground.

The increasing darkness did not check the struggle. The French, already defeated at St. Privat, 5 miles away to the right, as soon as they perceived that victory was impossible, concentrated all their efforts on single points. Immediately after sunset they attempted to push forward from the great quarry with fresh forces, designing, it seemed, to crush the German right. The Captain of the 8th company, 33rd Regiment, reinforced by some of the 2nd Jägers and 39th Regiment, was stationed at this point. He assumed command of the whole, and made a counter-advance on a heap of stones, behind which there was good cover. Opening fire from this point, he forced the enemy to retreat.

Other men of the 8th company under a Subaltern, the remainder of the 1st, 2nd, and 6th companies, each led by a Lieutenant, joined in the general advance which was now made against the road, mixed up with troops of the IIInd Army Corps.

The 39th and 40th Regiments, which had been thrown into the fighting line, went a few hundred paces beyond the position which had been won at midday. They did not reach the path leading from the road, nor yet the Point-du-Jour farm, which had already been burnt down.

When night settled on the field, the sounds of battle gradually died away along the whole line, although every now and then they blazed up again.

In order to restore order in the regiment, the Officers of the 33rd drew off their men to the gravel-pits and quarries, with a view of holding them during the night. But the Adjutant very soon brought orders that the regiment was to assemble at a point he indicated near Gravelotte. The 3rd battalion, therefore, together with the 3rd and 4th companies rallied at the east exit of the village. The 5th and 7th companies withdrew through the Mance valley; the 1st and 2nd followed the same route; whilst the 6th and 8th, who had been extended along the border of the wood, were led back by the ditches along the road, taking with them many of the more seriously hurt. It was a solemn retreat through the numbers of wounded

men who lay groaning on the ground. Those who had fallen in the wood, and who might have otherwise been passed unobserved, brought themselves into notice by repeated shots.

About 11 p.m., thanks to the guidance of the Adjutant, the last detachment arrived at the rendezvous. Colonel v. Henning welcomed the men of the different companies assembled. Officers with small detachments arrived from time to time. The companies arranged to re-form on the following day. The short night was disturbed by constantly recurring fire, which arose from vain attempts to dislodge the enemy from the ruins of the Point-du-Jour, but he clung obstinately to it until the following morning, when he quickly withdrew to the valley in rear.

The victory at Gravelotte was the most sanguinary of the whole war. The regiment had about midday come within range of the enemy's guns, and had been in the front line for ten long hours. 11 Officers and 172 men were killed, 13 Officers and 450 men wounded, 9 were missing, making a total of 24 Officers, 631 men, and 8 horses. This amounted to almost one-thirtieth of the total loss of the Germans at Gravelotte, and to more than a fourth of the strength of the regiment.

Com- pany.	Dead.			Wounded.			Missing.		
	Officers.	N.C.O.	Men.	Officers.	N.C.O.	Men.	Officers.	N.C.O.	Men.
1	—	3	18	2	6	32	—	—	—
2	1	1	20	1	4	48	—	—	2
3	—	1	8	—	4	20	—	—	4
4	—	—	4	1	1	23	—	—	—
5	—	1	3	1	1	14	—	—	—
6	1	2	14	—	8	33	—	—	—
7	2	1	21	1	3	87	—	—	—
8	—	1	8	1	3	23	—	—	—
9	3	1	19	—	3	28	—	—	—
10	2	3	18	3	4	38	—	—	1
11	2	1	14	1	3	26	—	—	2
12	—	1	9	2	3	35	—	—	—
Total..	11	16	156	13	43	407	—	—	9

On the 19th August the 3 battalions and 8 companies had to be placed under new Officers. A Captain commanded each battalion, and all the companies but two were commanded by Lieutenants, of whom 5 belonged either to the Reserve or Landwehr. 3 Officers were transferred from their own battalions, and 3 Lieutenants from their own companies.

To describe the effect on the troops of a great battle, such as that of Gravelotte, is almost impossible. Men's minds turn to joyful meetings with their comrades, to messages to those at home, to the

dead, the wounded, and the prisoners. And to these thoughts are added the physical sensations of weariness and hunger. All this has an enervating effect, and it is only gradually that men come to realize that the victory has been won and glory achieved. Troops which have fought in the foremost lines, and suffered very heavy loss, are in a state of apathy on the morning after a battle, such as only can be understood by those who have had similar experiences. In this sort of lethargic condition the regiment assembled, on the morning of the 19th, to the north-west of Gravelotte. It was several hours before the whole was collected. Now, for the first time, the losses could be accurately ascertained, and the places of the fallen Officers filled up.

The regiment now consists of 34 Officers, 157 non-commissioned officers, and 2,198 fusiliers.

As soon as the newly appointed Officers had taken over their commands, the regiment moved into bivouac nearer Gravelotte. The next thing to be considered was the recovery of the packs, which had been cast off by some of the companies. The full number were recovered, but in many of them the majority of their contents were wanting. Later on, this was found to have been due to the doctors, who had formed a field hospital in the valley of the Mance, close to where the knapsacks had been laid down; there being a great want of linen for bandages, the doctors had ordered the knapsacks to be opened, in order to supply the want with the stockings they contained. The men left with the packs could make no objection, considering the good purpose for which the articles were required. But not only had the stockings been taken out, but boots and shirts had also disappeared. This was hard on the companies concerned, for it would be impossible for some time to replace the things which had been lost.

About 4 P.M. the few remaining Officers of the regiment assembled at the bivouac to set out for the burial place of their comrades, those who only the day before had been with them, engaged in the same duties and filled with the same enthusiasm. A company followed, with the band of the regiment.

At the exit from Gravelotte, close to the north end of the road to St. Hubert, on the open field, was the place chosen. Thither the men of the different companies carried their Officers, and there laid them without coffins, clad in full uniform. The still living stood in a semi-circle round the dead, their hearts full of grief, and many eyes wet with tears. The Commander of the Division, with his Staff, brought up the rear of the melancholy procession. His bitter grief at the loss of his only son was increased by the loss of so many brave Officers and men of his division. The Chaplain of the division read the service. The words which he spoke sank into the hearts of his hearers. No eye but was filled with tears, and not a single voice was silent when the priest repeated the Lord's Prayer, and pronounced a blessing on the dead. Then those who had won fame and glory for their fatherland were laid in the ground. The band played the hymn "Jesus meine Zuversicht," and the solemn ceremony was at an end. No salute was fired for fear of awakening false alarm; and, moreover,

the Commander-in-Chief had, on August 19, given orders that: "No funeral volleys shall be fired during the war; the enemy's fire is the most honourable salute."

As they returned to the bivouac they met other processions setting out on the same errand. Every hour of the day spoke aloud of the solemnity of war, and of the heavy demands of duty. The day was drawing to a close when the melancholy procession returned to the bivouac into which they had entered in the morning. Every man sought for rest and solitude. Many of them found time to write a few lines home to friends, or to set them at rest about their husbands, brothers, or sons, and consigned them to a mail which was sent from Gravelotte.

While the VIIIth Army Corps had on August 19 taken up a position in reserve, the IIInd Army Corps was drawn up between Point-du-Jour and Moscow, to defend this important and commanding position against a possible attempt of the enemy to make a fresh advance; and also to strengthen the line by field-works. The fortress of Metz was enclosed on every side, and with it the French Army under Bazaine, who had drawn it back within shelter of the advanced forts. It was necessary, therefore, not merely to surround and perhaps besiege the fortress, but also to prevent any attempt on the part of the still powerful force to break out.

The command before Metz was entrusted to Prince Frederick Charles, and seven army corps and the 3rd Reserve Division were placed at his disposal.

During the 19th the VIIIth Army Corps was ordered to take up its position on the left bank of the Moselle, between the VIIth and IIInd Corps.

About 2 p.m. the bivouac of the 33rd was transferred to St. Hubert, but supplies of straw and food were not to be had. The afternoon was employed in burying the dead, and in clearing the field of battle.

On the 21st the 29th Brigade moved further to the south, nearer to the VIIth Corps. The troops were ordered to throw out outposts towards Metz, to prepare the ground for defence, and to build huts, the materials for the latter being procured from the neighbouring woods. Supplies were procured from the Commissariat Department.

The want of entrenching tools was severely felt, for many had been lost during the battle. However, huts were constructed and covered with foliage, and by the evening they gave sufficient shelter to the men. Straw was still wanting, but the granary of St. Hubert supplied a store of unthreshed wheat.

Necessity sharpens the wits, and the fusiliers had already learnt to make some sort of a bed for themselves. Small branches without leaves were placed in rows on the ground, upon these very leafy branches, and finally, the carefully preserved wheat was laid on top.

The regiment was soon fairly comfortable. Unfortunately, about this time, the Brigadier was compelled by severe illness to retire to hospital. Colonel v. Henning succeeded to his command.

The outpost position of the division extended from the hill near

Jussy past the Point-du-Jour to Moscow. The main body bivouacked; the 30th Brigade at St. Hubert, where the Divisional Staff also found quarters.

The 22nd of August brought no change in the situation. The regiment was occupied in making itself still more comfortable. Provisions were more plentiful, and of good quality. Bread, of which the troops had been long deprived, was regarded as a luxury. There was, however, one unpleasant circumstance: the weather changed, and rain fell heavily. Wind and rain will penetrate the best made hut of leaves and branches, and the clayey soil was soon saturated. As a natural and unavoidable consequence, dysentery broke out in the bivouacs, but not in a severe form.

The portion of the VIIIth Corps not employed upon the outposts were detailed to work at the entrenchments along the line of investment. This duty was not unfrequently carried out under fire.

Early on the 23rd Prince Frederick Charles issued the following order:—

“The 1st Army will carry the line of investment as far as the valley Chatel St. Germain, connecting with the right of the IIInd Army Corps in the Bois-de-Chatel, and extend past the farms of St. Maurice and Saulny.

“The camps of the IIInd Corps are to be made north-west of the unfinished railway.

“The change in position must be completed by 10 A.M. to-morrow.

“The corps on outpost duty will, early to-morrow, set to work on the entrenchments, and push forward round the fortress, so that our stealthy patrols (of infantry) may take up contact with the enemy's outposts.

“Every Commander of an outpost section will be held answerable to me that he is able to give accurate information as to the position of the enemy's outposts.

“I intend, by this means, to make opportunities for minor enterprises against the enemy's lines, and to turn to good purpose our superiority in field training and musketry.

“Posts of observation are to be established at every spot, either in front line or in rear, from whence a good view can be obtained of the Moselle and the fortress.

“The information acquired at these posts will be sent to me every day.”

These orders were received by the 15th Division at 7.30 A.M. on the 23rd, and the Divisional Commander thereupon issued the following:—

“As the present disposition of the 15th Division is no longer suitable, the line for the future will be divided between the two brigades.

“The 29th, on the right, will connect with the battery constructed by the VIIth Corps at Jussy, and extend 3,000 paces, as far as the old Metz road, north of the Point-du-Jour.

“The 30th, on the left, between this road and the Chatel St. Germain, in connection with the IIInd Corps in the Bois-de-Chatel.

“The camp of the 29th Brigade will remain where it is. The 30th will form a hutted camp north of Moscow farm.

“The brigades will allot a front of 1,500 paces to each regiment. This front is to be always held by a battalion. The sections of front are to be clearly marked in the entrenchments by sign-posts.

“In case of alarm the two remaining battalions of each regiment will advance to positions already indicated to them.

“Double sentry-posts are to be pushed so far forward in advance of the trenches that on the enemy’s approach the occupation of the fortified position can be readily carried out.

“The picquets, therefore, must be placed in front of the foremost line, but not too far.”

The 29th Brigade received the following orders from its immediate Commander:—

“The 33rd Regiment will, with one battalion and a troop of hussars attached, occupy the point from the battery which has been constructed west of Jussy by the VIIth Corps to a point about 1,500 paces west, at the angle of the road where the letter R of Rozerieulles stands on the French map.

“From here to the angle of the road between St. Hubert and the Point-du-Jour the 60th Regiment will post one battalion and a troop of hussars attached.

“The Officers Commanding battalions will command the outposts, and will send duplicates of all information to Brigade Headquarters at St. Hubert.

“Two companies from each battalion will be stationed outside the trenches; two companies within the entrenched line.”

At the same time, the 3rd battalion, 33rd, already on outpost duty, was ordered to occupy the position so carefully pointed out.

In order to comply with the instructions received, three picquets, each composed of a single zug, were sent out. Behind these were three supports, each two züge strong. One company remained in reserve.

The picquet on the right wing was placed in front of the winding road north-east of Jussy, with its support on the road. The next picquet on the left established itself east of the bend of the road in the neighbourhood of the quarry, upon the spur jutting out towards Rozerieulles; the support being 200 paces in rear upon the road. The third picquet was placed east of the Point-du-Jour with its support near the ruins of the farm.

During the first few days there was intense activity behind the line of outposts. Trenches and gun emplacements were quickly thrown up, and their occupation systematically arranged. In order to secure a rapid and effective occupation of the entrenched line, in case of sudden alarm, the whole of the battalion and company leaders were summoned to the Point-du-Jour, where the Brigadier imparted to them the necessary instructions. By night, the supports were to lie in the trenches.

At 5 o’clock on the morning of the 24th the 3rd battalion was relieved on outpost duty by the 1st battalion, for which purpose the latter had left the bivouac at 4.30. Whilst the infantry outposts were drawing back from the advanced night position to that

appointed for daylight, the Major of the Royal Hussars (7th) carried out a reconnaissance towards Moulins-les-Metz, past Longeau, with two troops, supported by a zug of the 9th company, 33rd. The hussars went ahead at a quick pace and soon came within the range of the enemy's fire. A Lieutenant was killed, but the infantry did not come under fire, and, carrying the Officer back into the bivouac on a bier made of stakes, returned without loss.

The next few days passed quietly. The French made no effort to disturb our working parties, or to dislodge our outposts. It appeared as if their troops were resting.

During the afternoon of the 24th the battalions not on outpost duty were summoned to the alarm post, and the congratulatory order of the King, issued on August 21st, was read to them.

The order was received by the troops with ringing cheers for their beloved King and Commander-in-Chief. The bands played the National Anthem, which the men sang lustily and with enthusiasm.

Such moments are more telling than might be thought. It is unwise to attempt to stir up the spirits of men frequently in this manner, as the feelings of ordinary individuals become quickly blunted, but such moments do untold good in keeping up the spirit and self-respect of an army.

The German soldiers from the Prussian provinces are slow and not easily moved, but when they are stirred to enthusiasm the effect as a rule is lasting.

The battalions quitted the alarm post with the bands playing. General v. Goeben (Commanding VIIIth Corps) had given instructions that the bands should play continually in the bivouacs.

Towards evening the two English guests arrived—they had been occupied in looking after the wounded—and rejoiced the Officers not only by their presence, but also by the distribution of a few flasks of wine. They remained in camp for a few days.

The life of both Officers and men had now considerably improved. Besides a welcome supply of cigars, there was a supply also of red wine, the more welcome as it contributed to repose.

It had been discovered by the Headquarters that MacMahon was marching up towards the Belgian frontier, and it was therefore deemed advisable that two of the investing corps should march west. To this duty the IIInd Corps was detailed, and its outpost position was taken over by the 16th Division. Thus the work at the front became more arduous, and a breach of the line was not impossible.

Prince Frederick Charles issued the following order:—

“As Metz has been completely invested during the past few days, and the different sections of the outposts have been in intimate connection, we may be certain that all communication from within as well as from without has been altogether cut off. The Generals and Divisional Commanders will pay the greatest attention to this point, and instruct the Field Gendarmerie very carefully to make all communication with the fortress impossible. To attain this end, which becomes daily more important, it will be necessary to cut by degrees a clearing several hundred paces broad through the dense woods

which lie within the lines. The infantry can cut down the under-wood with fascine-knives. The stumps which remain will make any movement of large hostile detachments quite impossible. In this work I recommend that all troops not actively engaged should be employed, especially those in first line. There is no better way of keeping off sickness than regular work."

This order threw an increased strain upon the troops. More incessant patrolling and greater watchfulness became necessary.

On the 28th our regiment was ordered to Gravelotte, to occupy the village and to protect the telegraph line.

The 1st and 3rd battalions huddled themselves at the east exit from the hamlet, north of the Metz road. The 2nd went to the west exit, and took possession of a camp which had belonged to the 72nd Regiment. A zug was sent to Mogador Farm to look after the telegraph, and two non-commissioned officers, with thirty men, went to the Fayon Mill on the Ars road.

The continuous bad weather made life in the huddled camps very disagreeable, and seriously increased the sick-list.

The hours off duty were spent in repairing uniforms and accoutrements. Instructions were received as to this work, and also more important ones concerning battle tactics.

"From the reports sent in on the victorious battles of this campaign I find that the cause of the great losses amongst the infantry is that they generally advance to the attack in battalion columns, following close upon the extended firing-line. I, therefore, direct attention to the following:—In the attack the artillery will commence with a well-directed fire, and in the very rare case where the encompassing or out-flanking of the enemy is impracticable, and a frontal attack over open ground becomes necessary, company columns and half-battalion columns, as laid down in the Field Exercises and practised on the drill-ground, must be resorted to. I leave to the brave fellows who have done the storming that work which, as yet, has never in their own opinion been beyond their power. But I expect that the Officers will use their intelligence to render success possible, by careful use of ground, by a reasonable preparation for the attack, and by employing suitable formations, and thus attain the desired results with fewer sacrifices.—WILLIAM."

This expression of the Royal will as to employment of formations learned during peace made the same impression on the Officers, because the French fire-arm had taught them that a frontal attack was invariably accompanied by a great deal of bloodshed. Beyond all, the importance of making united action possible had become apparent, and this was to be done by breaking up the firing line into smaller independent detachments. The gallant rush upon the enemy would have to be kept within bounds.

On account of Bazaine's attempt to break out on the right bank of the Moselle, August 31 and September 1, troops were drawn off from the left bank, and the 33rd was once more, on September 1, ordered up to the front line. The 1st and 3rd battalions took over the posts

hitherto held by the VIIth Army Corps at Jussy, the IIInd remaining at Gravelotte.

Two companies took possession of the heights of Jussy, and the post of observation there situated. Two picquets were pushed forward towards St. Ruffine. Two companies stood in support on the vine-clad ridge of Jussy.

Two companies held Jussy itself, and guarded the road from St. Ruffine.

Two companies took up their position at Vaux, to the east, to watch the Moselle valley and the road from Metz.

The right wing of these troops (1st and 3rd battalions, 33rd) rested on the left bank of the Moselle east of Vaux.

The 60th Regiment was on the left.

The battle of Noisseville, August 31 and September 1, and that of Beaumont, on August 30, with MacMahon, which proved not only the distance of the latter from Metz, but also his very unfavourable situation, caused another change in the disposition of the investing line, which considerably lightened the work.

On September 2 the VIth Army Corps was ordered to resume its position on both banks of the Moselle. The VIIIth Corps was ordered to occupy a line stretching from Jussy to the Chatel Rusie with one division. The other division was to remain in reserve with the corps artillery.

Prince Frederick Charles at the same time gave instructions for the future tactics of the investing troops:—

“Our defensive position must be strengthened, and bolder endeavours made by the infantry patrols to annoy continually, and to intimidate the enemy along the whole line. A stricter watch to prevent communication with the fortress must be maintained, and to hinder the escape of the inhabitants, who, in case of necessity, must be driven back with the cold steel.”

The 15th Division now assumed its proper position, part of the VIIth Corps holding the Moselle valley.

During the change of disposition the patrols, as usual, confronted the enemy.

On September 4, the French patrols advanced as far as the vineyard at Longeau, and caused some loss in our 3rd company.

A movement of the enemy, which was observed early on September 5 along the right bank of the Moselle, caused the VIIth Corps to concentrate on its right wing across the stream. The position thus left vacant on the left bank had to be re-occupied, and the 33rd Regiment, which on the previous day had gone into bivouac in the Bois-des-Vaux, was detailed for this duty.

The following dispositions were made:—

2nd Battalion	{ 2	companies in Jussy.
	{ 2	„ on the heights of Jussy.
1st Battalion	{ 2	„ in support of 2nd battalion.
	{ 2	„ in Vaux.
3rd Battalion	{ 2	„ securing the Vaux ravine.
	{ 2	„ in Vaux.

Soon after these positions were taken up a draft arrived from the Dépôt Battalion, 10 Officers and Aspirants, 20 non-commissioned officers, and 534 men.

This was a very welcome reinforcement, for, owing to losses at Gravelotte and sickness, our strength was considerably diminished.

The 6th of September was a day of honour for the regiment. The first Iron Crosses arrived for distribution. They were presented to the Colonel, a Major, a Captain, and to the fusilier who had made so daring a patrol during the battle of Gravelotte. The ceremony was public. The troops presented arms and the bands played in honour of the fortunate recipients.

The arrival of the draft led to a redistribution of the Officers.

The 3rd battalion received a new Commander, who appears to have come from another regiment. Three companies were handed over to Officers just arrived, and several Lieutenants and Second Lieutenants were promoted.

The regiment was now only a fifth under strength. The sick-list amounted to 3 Officers, 9 non-commissioned officers, and 159 men.

We remained several days in and before Jussy. A Subaltern remained at the post of observation. With the telescope set up there the French regiments could be distinctly observed in their bivouacs south of Metz, especially the cavalry in the large bivouac at Longueville-les-Metz. The enemy had also set up posts of observation. One of these was in communication with the outworks at St. Quentin and Plappeville. As soon as the posts descried each other, the Officer on duty on our side, with extreme courtesy, sent a greeting to the Officer on the other side, who politely responded. Already blockaders and blockaded were getting accustomed to the enforced inactivity, without the stern reality of war being in any way diminished. Now and again men on patrol or sentry duty were wounded. Life in camp and quarters was becoming very monotonous. There seemed little likelihood of attack from any quarter whatsoever.

This state of quiescence was broken by the following order of Prince Frederick Charles:—

“In order to precipitate the action of Marshal Bazaine, at 7 p.m. on September 9, 12-pound shells are to be fired against the hostile lines from as many points as possible. This bombardment must take place at a range of 5,000 paces, if possible from points close together; in addition, the army corps may make other efforts. The 1st Army will form a battery at Vaux against the strong position at Longueville. If other suitable localities along the investing line suggest themselves to the 1st Army from which large camps may be reached, fire may be opened from such spots by large batteries.

“The VIIIth Corps will engage Fort St. Quentin.

“The troops must hold themselves in readiness for movement and an opportunity for attack.”

The battalions of the 33rd were, consequently, sent down again to their old position on the Jussy height and along the border of the Bois-des-Vaux. It rained incessantly. On the stroke of 7, a field battery, posted east of the Jussy height, in the Moselle valley, opened

fire on Longueville-les-Metz. The heavy rain and the complete darkness interfered with the fire, which was soon replied to by Fort St. Quentin.

The French seemed to aim in the direction whence they supposed the fire to come; at all events, most of their shells fell on or near the Jussy height. The 1st and 2nd battalions were drawn up there, in a lane through the vineyard with a wall on either side. Each shell that flew over the heads of the fusiliers was greeted with an involuntary shrinking. Happily, not a single shell fell in the closed ranks of the column. We should have suffered great loss had one done so. For three-quarters of an hour the position of the regiment was a very unpleasant one. Heavy rain and huge shells make an uncomfortable evening, and every one rejoiced when, at 8 P.M., the "recall" was sounded.

On the 10th of September the 25th Division was ordered to take over the whole of the line of investment from Jussy to the Moselle above, and the VIIIth Army Corps was ordered to be transferred to the right bank.

The last paragraph of the order read as follows:—

"Every effort must be made to prevent the bad weather becoming a calamity. Every roof must be utilized. The outposts must be relieved from time to time in order that they may have an opportunity of drying their things under shelter. We shall overcome this evil (of bad weather) if food is regularly and plentifully supplied, if the troops face it in a determined spirit, and in the confidence that the enemy is in a worse plight than ourselves, a fact of which we are assured by the prisoners."

The VIIIth Corps now took up a position between the rivers Moselle and Seille. Headquarters were removed to Jouy-aux-Arches.

The 15th Division was transferred to the tract of country between the right bank of the Moselle and Augny; its right connecting with the left of the 16th, west of Marly-on-Seille. The Divisional Staff took up its quarters at the Gros Yeux farm.

The 30th Brigade held the outpost line from the Moselle to Orly-Frescati, keeping a regiment in reserve at Jouy.

The 29th Brigade, to which had been allotted a light and a heavy battery, 2 squadrons of hussars, and 1 company of sappers, held a position in front of Augny, in touch on the left with the 30th Brigade, on the right with the 16th Division. Brigade Staff at Augny.

After a short march, on the 11th September the fresh quarters were reached, and shelter was found at Augny for the 1st and 2nd battalions in barns and stables. The 3rd, at the disposal of the Divisional Commander, took over a hutted camp at Gros Yeux.

The new outpost district was very different to the one we had just left. The positions in front of Rozerieulles and at Jussy were on considerable heights, commanding the ground below. The plain of St. Privat forms the foreground of Augny. Over the surface of this plain an extensive view could be obtained, broken only by the Château Frescati and its wood. The heights south of Augny are insignificant. The highest of them is crowned by the ruin of St. Blaise. Here we

were on a level with the enemy, who as yet had constructed no strong defensive line, but had a powerful fort in St. Privat.

Orders were given to continue the investment with increased vigilance and precautions, and at the same time to increase the resisting power of the outposts by reinforcements.

Augny is a large and substantially built village, extending from north-east to south-east. The central point of the village is the château, standing in an extensive park, which, enclosed by a wall, stretches away towards the north, that is, in the direction of the enemy. The park wall, which had been crenelated, formed a natural fortification. Trenches and gun-pits on the rising ground completed the first line of defence. A battery was placed west of the village in a wood south of the Orly farm. It was provided with 12-cm. guns.

The 16th Division, on the right, held the Papeltrie on the height, and the Frescati wood as advanced posts. Neither of these posts was more than 1,000 paces from Fort St. Privat.

The enemy had his outposts in front and on either side of the fort, strongly supported by the Château de la Grange aux Ormes, close at hand, and by a farm a little way in rear.

From the observatory at St. Blaise, the French could be seen hard at work making trenches and communications, and enlarging the fortifications of St. Privat.

The Chief of the General Staff of the 1st Army now took over command of the brigade, our Brigadier not yet having recovered from his illness.

The close vicinity of the enemy necessitated that the troops on outpost duty should be always on the alert, in order that a perfect feeling of security might be maintained in the cantonments. With a view of having the whole outpost line under one command, the headquarters of the Officer Commanding outposts were established at Augny, and the charge entrusted to the Officer Commanding the 7th Hussars.

The two battalions in Augny were ordered to occupy strong houses in the village, and the street was barricaded.

In the course of the following day, after the arrival of the new Brigadier, the dispositions for the outposts were definitely arranged.

The picquets and supports on the right wing were furnished by a battalion of the 33rd; on the left by a battalion of the 60th.

On the 17th September the 1st battalion took up the new line. One company, in connection with the 16th Division, lay east of the park of Augny; two companies held the park, and the fourth held the western part of it in connection with the 60th, who occupied the Frescati wood, the Rhine Jäger Battalion sharing their watch.

The ease with which the whole ground between the wood and the Papeltrie could be overlooked enabled one cavalry picquet to do the whole of the outpost work by day. The vedettes had an uninterrupted view; hence two were quite sufficient. The infantry had a single picquet by day on the edge of the Frescati wood, but even here two sentry posts were sufficient. This arrangement considerably lightened the labour of the investment.

By night, the battalion of the regiment on outpost duty furnished two picquets and supports, which took up their positions before the cavalry picquet was withdrawn.

For the picquets which were nearest the enemy trenches had been constructed, and rifle-pits for the sentries, and also covered communications.

The battalion on outpost encamped in huts made of boughs. These day by day became more habitable, and it was a pleasure to inhabit them in the beautiful harvest weather which had now set in.

The outpost battalion was relieved every five days.

The two battalions of the 60th, and the one of our regiment, cantoned in Augny had their position in case of alarm pointed out to them.

The battalion of the 60th which held a house at the western exit of the village was to assemble close at hand; the other west of the road to Gros Yeux. Our battalion had to go to the eastern exit, between the roads to Coin-les-Cuvry and Gros Yeux.

The glorious harvest weather, the comfort of cantonments, and the regular and good rations made the investment far more pleasant, and the monotony of the life less burdensome. There was time, too, to repair our hardly-used clothes and weapons. Life in the camps became almost as regular as in garrison; drill and the usual parades, &c., helped to maintain the good behaviour and discipline of the troops.

Unhappily, the health of many of the men had been much shaken, partly by the great strain put upon them at the beginning of the war, and partly by the recent bad weather. The Commanding Officers of the 1st and of the 2nd battalions were both struck down by dysentery and typhus. The Captain of the 12th company was invalided home.

It gradually became clear that Marshal Bazaine and his army had resigned themselves to their impending fate. Not a day passed, indeed, without shots being exchanged between the outposts, and the forts fired shells in every direction, but there was nowhere any sign of real energy, and no preparations seemed making for an attempt to break out.

After the middle of September artillery fire ceased on both sides almost entirely. A unanimous but silent compact sprang up to spare the enemy. The French soldiers gathered courage to carry on the peaceful work of digging potatoes between the outposts, which plainly testified to the increasing want of supplies in Metz, a condition of things which must needs hasten the capitulation so anxiously desired.

This generosity on the part of his troops by no means fell in with the views of Prince Frederick Charles. He referred to it in orders in the following terms:—

“It has come to my knowledge that the digging of potatoes is carried on by the enemy on the ground between the outposts: these are essential to the blockaded troops, and I hear that our outposts have ceased to interrupt them in the work. This course of action is not what I desire, and I particularly wish the outpost duties to be

strictly carried out, and that the cessation of hostilities, which has received the tacit acquiescence of both sides, be no longer sustained. Considering the present state of affairs in Metz, it is absolutely necessary that the enemy should be pressed on every side, and for this great activity is demanded from the troops. Patrols must be on the constant look out for opportunities of irritating the hostile outposts, and, especially at night or during foggy weather, to harass them by minor attacks and by taking prisoners.

"I shall give Iron Crosses to those who distinguish themselves in such enterprises. The long ranging rifles of the enemy, which should be seized at every opportunity, may be advantageously used by good marksmen.

"The sentries and patrols are to leave their packs with the picquets. By this means any enterprise they may undertake will be rendered easier."

All the battalions not on outpost duty were now engaged in bringing in potatoes from every field in the country round, in order to keep up the supply of this necessary vegetable in the cantonments. The owners of the field had fled for refuge into Metz, and were much worse off with their own army than they would have been with our soldiers.

Besides collecting potatoes, the troops were occupied in building huts and improving the quarters in the village.

Trunks of trees were brought from the wood close at hand, and boards could be procured a little further away. In fact, behind the outpost line, life was a picture of peace. On the other hand, it had become much more lively at the front. Not only had the Prince's orders stirred the troops to fresh efforts, but the enemy gave them plenty of occupation.

On account of the increasing scarcity within the walls of Metz, the French were forced into making determined foraging expeditions. The majority of these were in the direction of the VIIth Corps, and led to much skirmishing. The troops of the VIIIth Corps were thus kept constantly on the alert, but without taking any share in the fighting.

Under orders from Prince Frederick Charles, we were next engaged in devastating the country round the fortress, so as to deprive the enemy of every opportunity of replenishing his fast diminishing supplies. Stores that could not be used were ordered to be destroyed. When inhabitants were found, they were made to thresh the corn. On September 23 and 24, the VIIth Corps was heavily engaged at Peltre and Merci-le-Haut. Our brigade was kept on the alert the whole time.

On September 26 two Second-Lieutenants joined the regiment from the dépôt battalion. Both had been so eager to meet the enemy that they had disregarded the orders which retained them at Cologne. Each of them, without the other's knowledge, had started off for the seat of war as soon as the news of Spicheren arrived. Their fate was the same. Both joined the regiment and then received orders to return at once to Cologne. They were tried by Court-Martial. The

sentence had to be confirmed by the King, and, owing to the events of the time, this was long deferred. The enthusiastic youngsters were ordered to join the regiment on service, and to atone for their errors before the enemy.

On September 29 news of the fall of Strasbourg was received, and all fears of Bazaine trying to break out in a southerly direction were set at rest. But, as a precaution against any such attempt towards the north, fresh dispositions were made of the investing troops.

The VIIth Corps took post at Montoy and Ars-Laquenexy.

The VIIIth Corps was ordered to hold the line from the Ars-Laquenexy and Remilly road as far as the Seille below Marly. The wood in front was held by the IInd Corps.

The reserve of the VIIIth Corps was placed behind the right wing.

The IInd Corps took over the position hitherto held by the VIIIth between the Seille and the Moselle, including the park of Marly, and the road between Marly and Magny.

The 15th Division, strengthened by a battalion and a battery, remained on outpost duty until the IInd Corps had got into position. At 7 P.M., in order that the movement might be hidden from the enemy, it was to evacuate its lines.

The new position was taken up on October 1, the river being crossed at Coin-les-Cuvry.

When the 1st and 2nd battalions reached Courcelles, their future cantonment, the accommodation was found to be utterly inadequate, in consequence of the great demands made by the field hospitals. They were obliged to take over a hutted camp near the railway. Living in these huts was found to be anything but pleasant, as they were not clean. In spite of the chilly autumn nights and the want of straw, the majority of Officers and men preferred to sleep outside, *à la belle étoile*.

The 3rd battalion was cantoned at Sorbey; the 1st and 2nd were soon directed to follow, and, on October 2, after a long interval, the regiment was once more re-united. Very few men had been wounded since the battle of Gravelotte, but the ranks were much thinned by sickness and disease. The sick report gave 6 Officers, 26 non-commissioned officers, 4 bandsmen, 3 sick-bearers, and 373 fusiliers of the active Army in hospital, together with 1 Officer, 3 non-commissioned officers, 1 bandsman, and 94 men belonging to the Reserve; a total of 511.

The new outpost line from Jury to Mercile-Haut was manned by 1 regiment, 3 Jäger companies, a battery, and a squadron, of which one battalion and a Jäger company furnished picquets and supports. A battalion held a hutted camp, constructed by the division, in the wood south of the road to Chesny and Laquenexy. The remainder of the troops found shelter near Courcelles and the Champel farm.

In order to put the whole 33rd Regiment on the alert with all possible speed, a beacon was set up on the heights of Haute Beux, and an Officer and six men placed in charge. As soon as the beacon was observed in flames "the alarm" was to be sounded in the cantonments. In order to avoid false alarm arising from errors in observa-

tion, stakes with cross-bars pointing in the direction of the beacon were set up in the cantonments.

In the new position the supply of rations improved very greatly; the corps magazine was in Buchy, and the railway at Pont-à-Mousson and Remilly was reopened for traffic on October 5.

Attention was next called to increasing the defensive strength of the investing line. The following is an extract from the Prince's orders of October 4:—

“The nature of the fighting of the last few days leads us to infer that the enemy intends sallying out and carrying by a strong attack, supported by the fire of the forts, our outpost line. The Commanding Generals do not consider it advisable or desirable to retain the outpost line. In this way Peltre, Maxe, and Ladonchamps have been abandoned during the last few days. . . . The enemy may thus be drawn within reach of our fortified main-line. . . . If he makes any considerable attack, the outposts will do well to draw off, as soon as the movement is pronounced, to either flank, unmasking our main line. If he makes no advance beyond the outpost line, that line is to be re-occupied; he must not be allowed to locate himself there for any time.

“The co-operation of our numerous artillery will be of the greatest service.

“Considering the fact that the weather has broken, it is absolutely necessary to provide for the better lodging of the troops, or, at all events, of the greater portion. Although our readiness to meet attack will be diminished by the men being occupied in constructing camps, the risk can be alleviated by posting batteries in strong positions, in order to keep any considerable attack in check until the troops could come up from the rear.

“For this purpose it will be necessary for each army corps to build a few *sturm-frei* works. Hitherto our fortifications have only been designed to secure for us a more advantageous battle-field. This duty must be undertaken at once, for in six weeks the frost will probably put a stop to the work.”

Although the troops were now incessantly employed and that the camps were made comfortable, the health of the men did not improve as had been hoped. When the defensive position had been so strongly entrenched as to be almost *sturm-frei*, it became possible to canton the battalions over a larger space, as there was now no danger of the first line being suddenly called up.

On October 14 the 29th Brigade relieved the 30th at the front. The 60th Regiment took over the outposts and first line for six days. The 33rd remained in support at Sorbey, Champel, and Courcelles. The 30th Brigade was in reserve, between Pontoy and Mécleuves, east of the railway. On the 20th, the 33rd relieved the 60th. The weather was again bad, and the duty on the outpost line was very heavy. The roads were quagmires, and the trenches and communications knee-deep in water.

The position extended from the copse west of Ars-Laquenexy to the point where the railway crosses the Strasbourg road. An observation

post was established at the Merci-le-Haut château. This post was one of danger, for the gunners in Fort St. Quentin persistently tried to frighten the Officers on duty out of the place with shells; the projectiles, however, soon ceased to alarm, for they very seldom burst.

Three infantry picquets remained day and night in the trenches; one in front of the Laquenexy copse; a second south of Merci-le-Haut, near the Strasbourg road; a third behind a signal house on the Saarbrücken railroad. A Jäger post was thrown forward by day into the avenue which led from Merci to the Strasbourg road.

One battalion formed the outposts, two companies in the Laquenexy copse; the others in the wood north-west of Jury. The latter was prepared for defence. A deep trench was dug, and the salients were entangled.

Detached posts, under non-commissioned officers, were posted at the salients.

Gun emplacements were constructed between two little walls, and here a section of artillery took post. A company was stationed as escort in a shed close at hand.

Jury was strongly fortified, and a deep communication led to the Jury wood. The 2nd battalion held the village; the 3rd the wood between the village and the Champel farm, on the road from Chesney to Laquenexy, sheltered in huts.

The whole outpost position had the appearance of an entrenched camp. The enemy was very close at hand. He had already made several attempts against the position. The village of Peltre, immediately in front of the outposts, was neutral ground, incessantly patrolled, and Fort St. Quentin was hardly more than 3,000 paces distant.

The outpost battalion was relieved every second day at 5 A.M. The position was a dangerous one, and Colonel v. Henning said in orders that "it was a privilege for the regiment to be detailed to occupy this section."

In order to give the picquets the power of firing at long range, they were armed with captured chassepôts.

On October 23 unusual commotion was noted from the post of observation in the enemy's lines, and the rumble of wheels was heard at Grigy. The position was manned, and, although our patrols came across hostile parties of inferior strength in the open, nothing came of the alarm. A strong patrol was sent out under an Officer-aspirant to Peltre in order to procure information, which met a French patrol and routed it. On the day following, a report having reached Headquarters that the enemy was likely to attack on the 25th, the next day the whole took up a position for battle. One battalion, 33rd, held the trenches between Jury and the Champel wood; a second the trenches on either side of the road, being careful to take up their positions unobserved. A battalion held the south border of the Jury wood, and another the north border, in communication with the detached company with the guns.

The French did not come, but a far worse enemy, against whom the strongest position was of no avail. Heavy rain and a bitterly

cold wind set in, which continued, to the great discomfort of the outposts, for six days.

The 11th company received a new Commander, an Officer relieved from his duties as Professor at a Cadet School.

By October 27, we had been on outpost duty for six weary days, and every one was trying to dry his clothes and get rid of the tenacious mud.

But on this day the capitulation of Metz was signed by Bazaine, and all thought of the toil and suffering which had led to this result was put away. There had been no hope of so speedy a termination of the investment.

To the 15th Division fell the honourable part of taking possession of Fort St. Quentin, and the regiment was detailed to procure fuel for the prisoners. 1,000 men under a Subaltern were sent for this purpose to Pouilly.

It is impossible to describe the scene, of which part of our battalions were witnesses, when the road leading south from Metz was suddenly covered with throngs of men, moving in perfect silence, soldiers without weapons! The 2nd Corps d'Armée (Frossard), which had been our opponent at Gravelotte, and the Brigade Lapasset, which had been encamped opposite to us at Augny, had to pass through the lines of the 15th Division. The French regiments marched with a brave bearing under pouring rain into the bivouacs assigned to them. Their captivity, although received in Germany with universal joy, could not fail to touch our hearts very deeply. Our shouts of jubilation were stilled at the sight of those broken and defeated soldiers, standing side by side in the dripping rain, silent and apprehensive. The Fusiliers, much moved by the sight, marched back to camp without a word.

The connection of the 1st Army with the investing force now ceased, and once more it was united as a whole. General v. Manteuffel, hitherto Commanding the 1st Corps, was appointed to succeed General v. Steinmetz, who had been transferred to a post at home on September 16, in command of the Army.

On October 31 orders were received for the regiment to join in an expedition to clear the Argonne Forest of franc-tireurs.

The 3rd Cavalry Division was to do the work, supported by the 33rd and two of the divisional batteries.

Thiaucourt was to be our first halting place, and in order to cross the Moselle, we had to use the pontoon bridge at Arry. But when the regiment reached the Moselle, they found no pontoon bridge, for, owing to the unceasing rains, the Moselle had risen so much as to make the bridge useless. The next crossing was by the chain bridge lower down the Moselle between Corny and Novéant. The march, therefore, had to be continued to this place. Then, having effected the crossing, we had to march again up the Moselle, in order to get into the road to Thiaucourt. This unexpected prolongation of the march fell rather hardly on the regiment, as we had had no rest since our last outpost service, nor any opportunity of seeing to the much-needed repairing of boots. The troops, whose bodily health

had suffered considerably from sickness, to which almost every man had, one time or another, fallen a victim, were not fit for heavy marching, which had rarely been demanded of them during the siege. The weather improved to some extent during the march, but the roads were very heavy, owing to the long rains, and considerably impeded their progress; but the march of 25 miles continued until late in the evening. Many men were left behind. The hopes of comfortable quarters were soon dissipated, for when the regiment arrived at Thiaucourt at 6 p.m., the Adjutant, who had been sent on in advance, informed them that the place which had been supposed at headquarters to be unoccupied, was filled with troops of the IIIrd Army Corps, and that the regiment would have to resort to a bivouac. On account of the great fatigues of the day, and the utter weariness of the men, Colonel v. Henning determined to ask General v. Alvensleben, who was in command of the IIIrd Army Corps, for permission to bring his men at least under shelter, although the place was already very full. General v. Alvensleben gave the desired permission, and room was found in a few empty houses. Rations could not be procured, but the men were so weary that all they thought of was sleep.

The regiment next day joined the Cavalry Division.

On November 3 the whole force, consisting of the 33rd, the 5th, 7th, and 14th Uhlans, the 8th Cuirassiers, and one horse artillery battery, set out on the march to the Meuse.

Count v. Groeben, on account of the weariness of the infantry, ordered November 5 to be kept as a day of rest; this our regiment made good use of in improving, so far as time allowed, the condition of their kits. Although it was only a few days since we had left the pestilential atmosphere round Metz, yet already the health of the men was much improved. The plentiful supply of wholesome provisions, the beautiful autumn weather, and short marches soon effected a great change in the physical condition of the men; they became stronger and sounder every day.

The approach to, and the march through, the Argonne forest was to be executed on the 6th. Count v. Groeben divided the troops into three detachments. The 1st detachment consisted of the 7th Cavalry Brigade, the 3rd battalion, and the 1st and 2nd light batteries. The 2nd detachment, the 6th Cavalry Brigade, the 1st battalion, and a horse artillery battery. The 3rd detachment was formed of the 2nd battalion, and one squadron of the 14th Uhlans.

With a view to the accomplishment of the task committed to him, Von Groeben decided upon a general exploration of the Argonne forest the next day. For this purpose, orders were given that the forest between the Aire and the Aisne, north of the road from Clermont to Ménehould, as far as Vienne-le-Château, should be thoroughly searched. The 1st and 2nd detachments were ordered to search the whole extent, from east to west. The main part of the work had to be done by the infantry, as, owing to the irregularities of the ground, the cavalry was of little use. The latter encircled the whole forest, and undertook the reconnoitring and searching of the hamlets. The

batteries were held in reserve. The 3rd detachment was ordered to search all the places lying in the forest south of Vienne-le-Château, punctually at 7 A.M., and to prevent any person escaping. At the appointed hour these places were surrounded by the 2nd battalion, and thoroughly searched. At the same time the surrender of all persons not belonging to the villages was effected.

The result of the search did not answer to the expectations. It may be that on the approach of the troops the franc-tireurs had quitted the shelter of the forest with all possible speed; or else that the patrols who had sent in the information had described the supposed bands as more numerous than they really were. Only a few suspicious persons were found. Neither was the capture of weapons anything considerable.

As soon as the work was completed, a rest of several days was permitted, until the 1st Army, which was leaving Metz, should arrive near the forest. The battalions passed these days in their quarters, setting their clothing and equipments to rights.

On November 12th, the 15th Division was again assembled. Lieutenant-General v. Kummer, the new Commander of the Division, greeted the regiment at the place of assembly. The Officers were presented to their new chief by Lieutenant-Colonel v. Henning, and openly manifested their joy at having for their leader a General whose name was already famous. General v. Kummer thanked them with a few hearty words, and then issued the following orders for the next few days:—

“As the Division entrusted to me is once more united, it becomes my duty to explain certain principles which I desire to recommend to your practice.

“The highest value is justly set upon strict discipline on the march. Every body of troops should be well closed up, and Officers and non-commissioned officers always found in their appointed places.

“I will have neither laggards nor stragglers; if such are found, it is a sure proof of laxity of discipline, even if the cases are very rare.

“As a general principle, in consideration of the time of year, I shall require, when we have left the camps, a march of an hour and a half, followed by a halt of twenty or twenty-five minutes; then another march of an hour and a half, followed by a halt of twenty or twenty-five minutes as before, and so on, until we go into quarters. The march must be begun at an early hour; by the most distant detachments as early as six o'clock; a corresponding early arrival in camp will be thus secured for these short days.

“The cavalry will, when possible, lead the van, and act as advance party. They will have to reconnoitre the country in front and on each side, send in any information they acquire punctually, and keep in close connection with the infantry. The cavalry must serve as eyes to the Commander, carefully observe everything, and keep him duly informed. The infantry must always march in column by companies, at fifteen paces distance.

“The formation of the infantry for action will be as follows:—

From each battalion of the infantry brigade two companies will advance; the two other companies will remain in the rear as a half-battalion.

“The brigade in the rear will form a line of a company column on the centre, and will be held together until the objective of the attack is declared. It is self-evident that its position must be selected so that the second line shall be beyond the reach of the enemy’s fire, and yet so close to the first that it will be able to take a hand in the fighting immediately its aid is required.

“I expect all those in authority to give short, decided orders, each one in his own department, allowing for the entire independence of those under him, as far as it may be permissible. Each Officer must be careful not to multiply orders unnecessarily, especially in small details. When an order is once given, it must be carried out with energy and punctuality. The care of those beneath is the main task of every superior Officer. Any one who fails in this is wanting in one of the characteristics of a good soldier. Our men are ready to endure the most severe hardships, and this spirit entails on us the necessity of looking to their comfort.

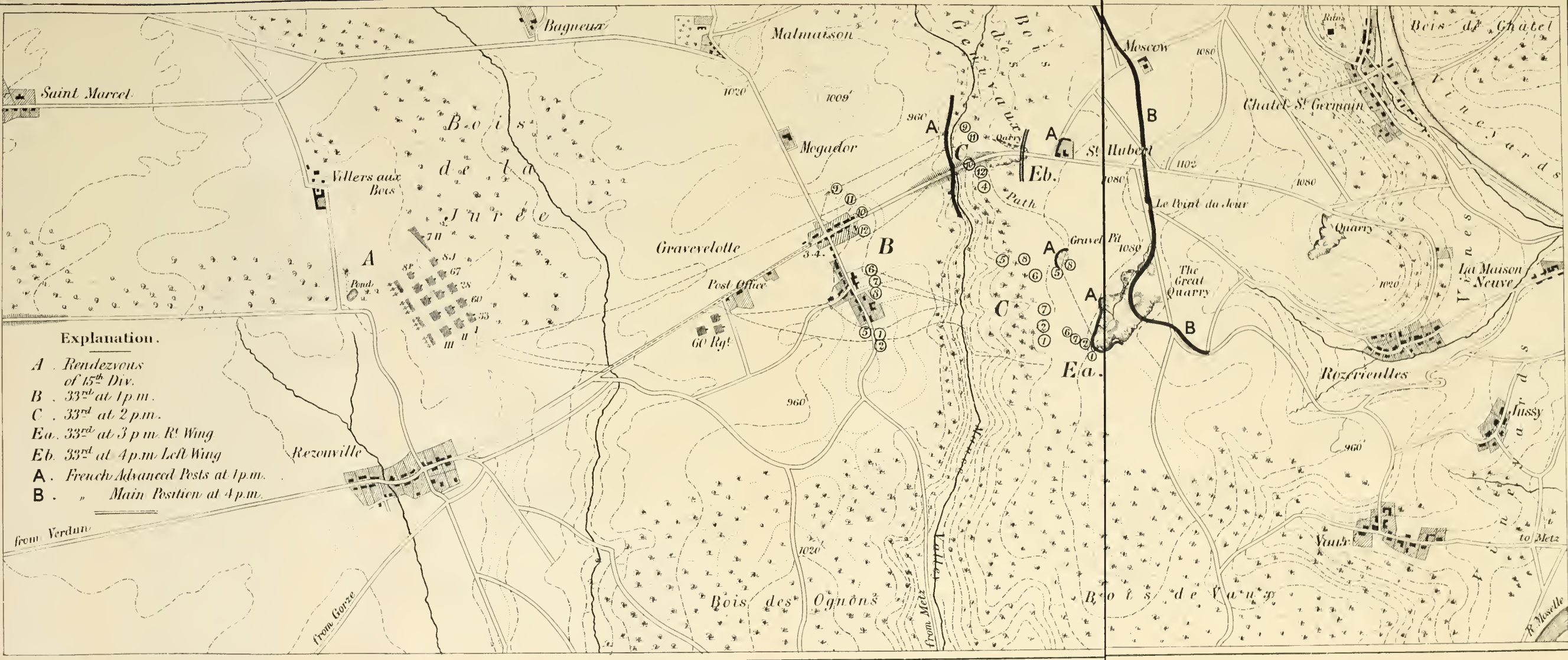
“I shall expect every Officer to be able, every morning, to answer the questions I shall put as to the conduct of those under him on the previous day.

“The preservation of materials requires very strict attention; the guns and weapons must always be kept in good condition; the repairing and supply of boots must be carefully seen to, &c.”

The condition of the men’s boots was daily becoming worse. It was very difficult to procure new ones, and when the neighbourhood of the large city of Rheims, reached on the 13th, offered a good opportunity of remedying this want, permission was at once accorded to the troops to make use of it. Unhappily the shops at Rheims produced only a very meagre supply of shoe leather.

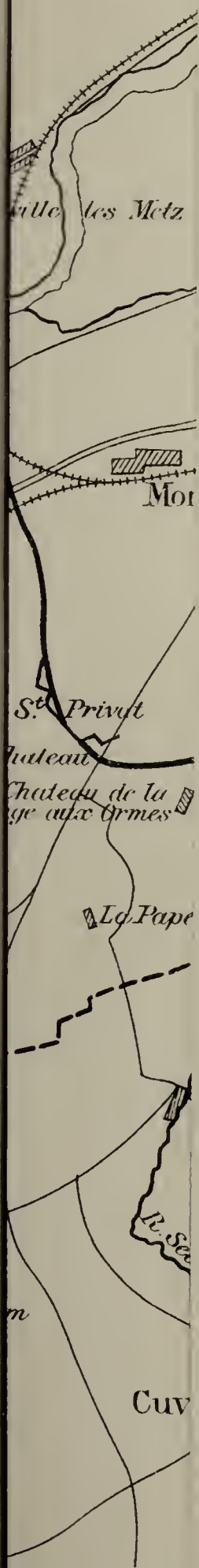
The war had already entered on its second phase. Another arduous campaign was about to commence, under somewhat different conditions, and the operations of the 33rd against the troops of the Republic will form the subject of a second paper.

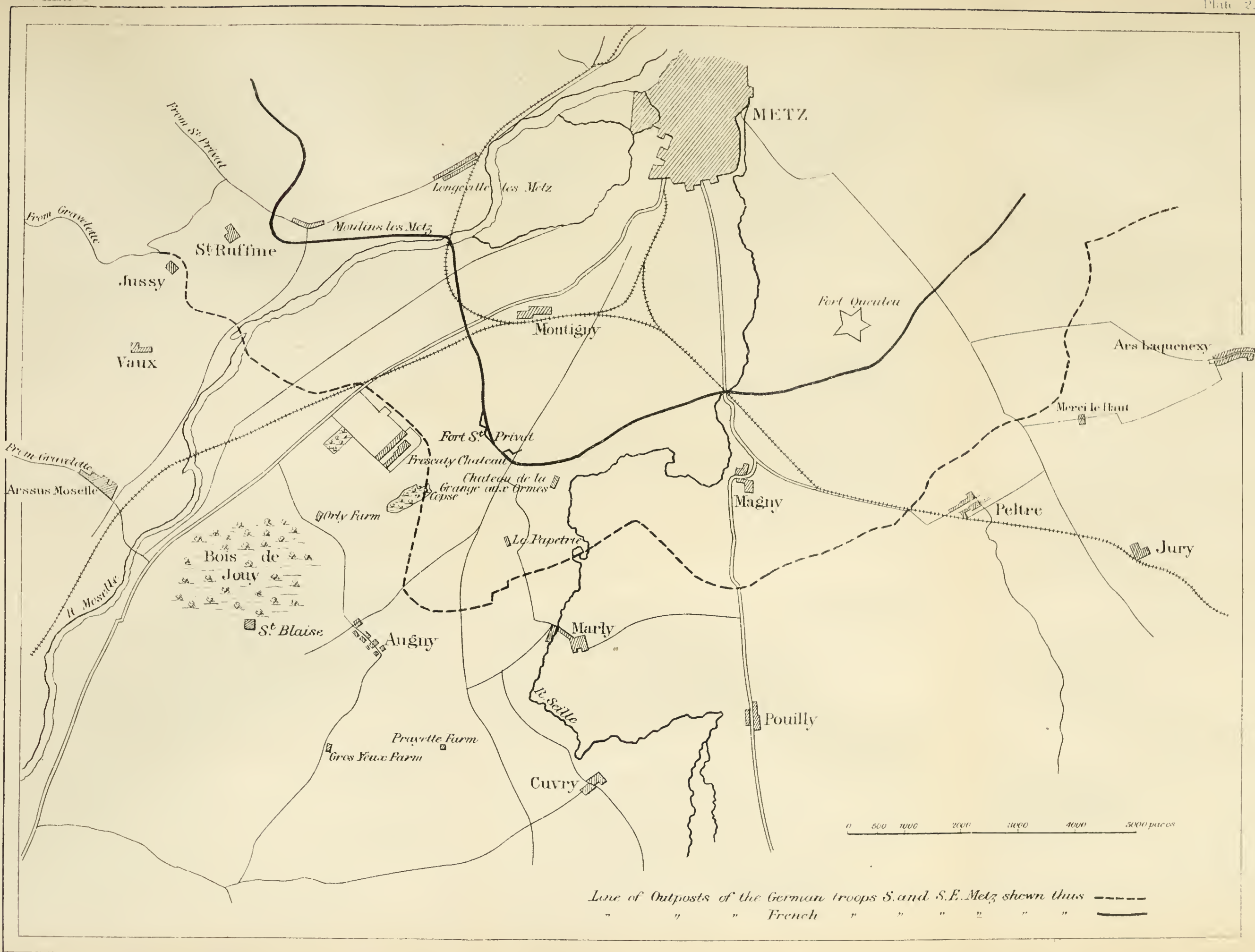
(To be continued.)



Explanation.

- A. Rendezvous of 15th Div.
- B. 33rd at 1 p.m.
- C. 33rd at 2 p.m.
- Ea. 33rd at 3 p.m. R^l Wing
- Eb. 33rd at 4 p.m. Left Wing
- A. French Advanced Posts at 1 p.m.
- B. " Main Position at 4 p.m.





EXTRACT OF A LETTER WRITTEN BY GENERAL THE BARON VON MÜFFLING SHORTLY AFTER THE BATTLE OF WATERLOO.

Translated from the "Militär Wochenblatt" by Captain W. A.
MACBEAN, R.A.

THE following is an extract from a letter written by Müffling to Boyen shortly after the Battle of Waterloo. Preserved in the archives, it was recently published by the Royal Prussian War Ministry, and appears in the "Militär-Wochenblatt" of November 14, 1891:—

" . . . I have never yet seen such a furious and bloody battle as this one was in the English position. There is not one in the whole history of war in which the different arms so constantly fought in close co-operation, for from 3 P.M. until evening, Bonaparte always attacked with cavalry and infantry *simultaneously*, and had his batteries so placed that they could continue firing during these attacks.

"In one attack the cuirassiers broke through the intervals and attacked the 3rd line, while masses of the enemy's infantry fell upon the 1st.

"An English battalion of the right wing repulsed eleven cavalry charges, and *not a single battalion* was penetrated. For coolness, bravery, and interior discipline, there is nothing like them in all Europe, but, on the other hand, they have little manœuvring power, and are extremely slow. The Duke of Wellington himself said to me, when I urged him at Quatre Bras (battle of the 16th) to press the attack more quickly, that that would not do—that one must give the English time, and not attack until they are fully formed. 'Ah!' I sighed, 'would that the situation were reversed; would that the English were in position, and the Prussians ready for the offensive! From what I see to-day,' said I to the Duke, 'we should then be invincible.'

"My conviction on this point was very strong, and the Duke of Wellington seems to have shared it to such a degree that, when we had to retreat on the 17th, and when the Duke asked my opinion as to what was to be done, since Bonaparte would infallibly fall with his whole force upon the English Army, he immediately agreed when I proposed to him that he should place himself on the defensive at the forest of Soignies, and leave the offensive to the Prussians. I did not conceal from him the difficulties of his situation in case he were beaten, but he had already recognized them at a glance, and he was determined not to give up Brussels. In that case there was no other position available than the one he chose.

"Before we arrived there I said to the Duke, 'If only there were

an apparently weak point in the right flank of your position, so that Bonaparte might assail it right furiously, and neglect his own right wing to such an extent that he should fail to discover the march of the Prussians ! ’

“ And see ! when we arrived there, there lay the advanced post of Hougomont, upon which he (B.) indeed fell.

“ It was as if Heaven had guided everything so as to effect B.’s downfall.

“ Had we been victorious at Ligny, the consequences would have been unimportant ; only at this distance from the Sambre could such results arise.

“ MÜFFLING.

“ *Le Cateau, 24th June.*”

NOTICES OF BOOKS.

My Mission to Abyssinia. By GERALD H. PORTAL, C.B., H.B.M. Agent and Consul-General at Zanzibar. London: Edwin Arnold, 1892. Pp. 261. Size 9" x 6" x 1½". Weight under 1 lb. 14 ozs. Price 15s.

When, in 1887, Italy was preparing to revenge the massacre of Dogali, Mr. Portal was despatched by the British Government to Abyssinia, to attempt to bring about a pacification between King John and the Italians. Not a moment was to be lost, as the favourable season for warlike operations was already commencing, and the Italian Government could not undertake to refrain from acts of overt hostility for more than five weeks, *i.e.*, till the end of November. Mr. Portal was accompanied in his mission by an interpreter, an English servant, and Mr. Beech, A.V.S., left Cairo for Abyssinia, the mission being conducted with the greatest secrecy, and on the 29th October arrived at Massowah. On the 11th November the mission, which had already suffered severely from the heat, arrived at Asmara, where the great Abyssinian warrior, Ras Alula, the leader at the massacre, received them. After a detention of ten days, the mission was allowed to proceed, and on the 4th December arrived at the King's camp. The dangers to which the mission was constantly exposed, and the calmness and courage with which they were faced, are simply and modestly recorded in this book; whilst we obtain from it also much light as to the habits and characteristics of the Abyssinians as a nation.

The Afghan Wars, 1839-1842, and 1878-1880. By ARCHIBALD FORBES. London: Seeley, 1892. Pp. 337. Size 8" x 5¾" x 1¼". Weight under 1½ lbs. Price 5s.

The first part of this work, which is one of the "Events of Our Own Time Series," is a very clear and concise history of the war of 1839-42; it is unprejudiced, and is unbroken in its continuity by digressions regarding this or that policy; and it contains some new and interesting matter relating to the evacuation of Caubul, and the subsequent events bearing on General Sale's force at Jellalabad. The second part is a deeply interesting account of the later wars. Altogether I think no history of these wars that I have read is more instructive than the small volume under notice.—G.

The Battle of Spicheren: a Study in Practical Tactics and War Training. With maps, plans, and sketches. By Brevet-Major HENDERSON, York and Lancaster Regiment, Instructor in Tactics, Royal Military College, Sandhurst. Chatham: Gale and Polden. Size 7" x 5". Pp. 300. With additional appendices. Price 6s.

The Campaign of Fredericksburg, November—December, 1861: A Tactical Study for Officers. Third edition. By Brevet-Major G. F. R. HENDERSON, York and Lancaster Regiment. Chatham: Gale and Polden. Pp. 195. Size 7" x 5". Price 5s.

In the year 1886 a work on the campaign of Fredericksburg was published anonymously. The author stated on the title page that it was written for the instruction of Volunteer Officers. Now appears a third edition of the same book, with Major Henderson's name attached; and there is no cause for surprise at the great success of a book composed with such marvellous clearness as is this early work. Officers not only of Volunteers, but of Militia and of the Regular Forces, have read and learnt much from Major Henderson's writing.

Simultaneously with the new edition of *Fredericksburg*, he has published a careful study of the battle of Spicheren. In dealing with the incidents of the American war, historians labour under great difficulties ; the country was ill-mapped, in many portions indifferently supplied with roads, and but a small Staff of trained Officers existed capable of recording the swiftly moving incidents of the War of the Rebellion.

In 1870-71 the theatre of war was well known ; roads and railways were numerous ; excellent maps abounded for those who did not despise them. In addition there was a body of Staff Officers on either side, highly instructed in all military matters. The German Staff account is an accurate rendering of the battle of Spicheren.

But Major Henderson has not limited himself to this work, and merely retold the story in other words. He has delved deeply into the regimental histories of the forces which on either side took part in the battle. Comparing these accounts, he has produced a detailed account of the fight, and from a perusal of these details the reader can realize better than ever he has before the various phases of the struggle. Major Henderson has also considered the various incidents from a critical point of view, and has drawn from them lessons for the use of those into whose hands the book may come. This work is the first thoroughly critical account of a battle of 1870 from an English writer. The last two chapters are devoted to the consideration of the tactics of the battle and the training of the troops, and both these and the historical portion of the work are written in the clear and lucid style which drew so much attention to the author's previous publication when it appeared anonymously. In an appendix are between thirty and forty questions, which can be worked out by the reader. Their purport is not to help the reader to ascertain how much he remembers of the text itself, but to lead him to question himself as to the method he would have adopted had he found himself in the situations referred to in the questions. The maps accompanying the text are numerous and well drawn.

The Development of Navies during the last Half Century. By Captain S. EARDLEY WILMOT, R.N. London : Seeley, 1892. Pp. 295. Size $8\frac{1}{4}'' \times 5\frac{3}{4}'' \times 1\frac{1}{4}''$. Weight under $1\frac{1}{2}$ lbs. Price 5s. "Events of Our Own Time Series."

This work is dedicated by permission to the Queen. In it Captain Wilmot, taking as his starting point the Navy in 1840, proceeds to review the changes which half a century has produced in the fleets of the world, and endeavours to draw lessons for future guidance. What has been done in this country forms the main portion of the book, but the progress abroad is also dealt with, as showing the great advance made by other nations. The principal operations in which squadrons and single ships have engaged during this period are briefly described, and demonstrate certain phases of naval warfare connected with modern armaments. In the second chapter the author describes the gradual creation of a steam fleet. The introduction of broadside ironclads into the Navy is next described. This is followed in succession by accounts of the early turret-ships ; the barbette system combined with broadside ; coast defence ; the ram ; armour ; later turret-ships ; cruisers ; ordnance ; torpedo warfare ; and steam propulsion. Captain Wilmot concludes his book with two chapters devoted to foreign navies. The book is excellently written and profusely illustrated. In the comparatively small space at his disposal, Captain Wilmot has succeeded in describing the historical development of the Navy most concisely, and yet so clearly that the work is of great value as a history to the lay as well as the naval reader.

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THE MIRANZAI EXPEDITIONS, 1891.

By Captain A. H. MASON, D.S.O., R.E.

DURING the past year another not inglorious little war has been added to the long roll of expeditions on our Indian north-west frontier. Twice during the year has Sir William Lockhart overrun the country of the Orakzais, and he may well be congratulated on the successful termination of the operations he has so ably conducted.

To the readers of this Journal some short account of these operations may be of interest, more especially as they afford a very typical example of the kind of warfare which Officers serving in India may at any time find themselves called upon to take part in.

To make the account intelligible to the reader it will be necessary first to give a brief description of this part of our frontier, and more especially of the Orakzai tribe dwelling just beyond the border. Until quite recently hardly anything was known either of the Orakzai tribe or of the country occupied by them, and owing to the "close border" system followed by the Government of India since the annexation of the Punjab, no European (with two exceptions) had penetrated into this little known country.

The Orakzais are a tribe of Pathans who inhabit the mountains to the north-west of the Kohat district. They are bounded on the north and east by the country of the Afridis, on the south by the Miranzai Valley and on the west by the Zaimukht country and the Safed Koh Mountains.

Their origin is buried in obscurity, and though they resemble the Afghans in language, features, and many of their customs, they are rejected by them as brethren, and assigned a separate origin, but there is little doubt that they are an offshoot of the great Afghan family. The late Sir Charles Macgregor, an authority on the tribes of the Punjab frontier, says they are probably not worse than their neighbours in respect of the usual deceit, avarice, and cruelty of their race. He says that no one would doubt that an Orakzai as much as any Pathan would not shrink from any falsehood, however atrocious, to gain his end; money would buy his services for the foulest deed;

and cruelty of the most revolting kind would mark his action to a wounded or a helpless foe. This, however, seems too dark a picture, and those who know anything of Pathans must recognise that, though they certainly have bad traits of character, they have also some excellent qualities, especially as soldiers.

The Orakzais are divided into six main divisions, which are again sub-divided into numerous clans and sections, but it is not necessary to burden the memory with the names of these, suffice it to say that the whole tribe is estimated to number about 25,000 fighting men, armed for the most part with matchlocks and swords, but having among them a certain number of Snider and Martini rifles stolen from British territory or procured from Kabul. Like the Khaibar Afridis they migrate during the summer to their higher settlements in Tirah, but in the cold weather come down to the Khanki Valley, and the Samana Range bordering on Miranzai.

Their country is wild and mountainous, but not wanting in attractions. It is thus described by one who knew it: "Emerging from wild and craggy defiles with a solitary tower perched here and there up on the overhanging rocks, the stranger comes suddenly on the village site; springs of refreshing clearness pass from rocky cisterns to the brook which had repeatedly crossed his path in the defile, and which is here fringed with rows of weeping willow and edged with brightest sward. The village is half-hidden from view by overshadowing mulberry and poplar trees; the surrounding fields enamelled with a profusion of wild flowers and fragrant with herbs. At some distance is seen a wood of thorn and tamarisk, in which are the graves of the village forefathers; an enclosing wall of stone and votive shreds which are suspended from the overhanging tree, pointing out the 'ziarat' of some saintly ancient, which children pass with awe and old men with reverence. The dream of peace and comfort which the contemplation of such scenes suggests is, however, rudely dispelled by the armed ploughman who follows his cattle with a matchlock slung at his back, by the watch-tower occupied by a party of men to guard the growing crops, and by the heaps of stones visible in all directions, each of which marks the spot of some deed of blood." A picturesque description and, from what our troops saw, true in the main.

On glancing at the map, it will be seen that the Miranzai Valley stretches away to the west of Kohat as far as the outpost of Thal. The valley is part of British territory, and is inhabited, for the most part, by the Bangash tribe, with a sprinkling of Orakzai and Zaimukht immigrants. It is bounded on the north by the high range of hills rising to 7,000 feet, known as the Samana, at the northern foot of which range is the Khanki Stream, running parallel to the Miranzai Valley. It is with the Orakzais inhabiting the Khanki Valley and located on the Samana that we are more immediately concerned.

After the annexation of the Punjab, the people of Miranzai were, owing to their inaccessibility, little interfered with, but in 1851 it was found necessary to send a force into the valley to reduce the people to subjection. This was followed by further visits of our troops under

Brigadier Neville Chamberlain in 1855 and 1856; and then the people finally settled down and became peaceful British subjects.

Although the old tribal territorial boundary of the Bangash Pathans to the north of Miranzai had been recognised as the watershed of the Samana Range, and was in consequence, on our annexation of the Bangash country, the true limit of British territory, our claim was not immediately enforced, and this omission has led to much of the subsequent trouble on this frontier.

The Bangash chiefs lived at Hangu, the principal town of Miranzai, and from their position and wealth were able to exert a considerable influence among the hill-men across the border. The head of this family was called the Khan of Hangu. In former times the Durani governors of Kohat usually employed the Khan of Hangu as deputy governor or farmer of the revenues of the Miranzai Valley, and as middleman for dealing with the neighbouring mountain clans. All the various tribes or clans in the neighbourhood on both sides of the border were then, and still are, divided into two great hereditary political parties or factions, like Whig and Tory, known as Gar and Samil. The family of the Hangu Khan is Samil by party, and thus its head, in addition to being clan chief of the Miranzai Bangash, became recognised as party chief or leader of this faction. The Orakzai clans which looked up to him as their head were the Rabia Khel, Mamazai (Daradar), Malla Khel, Shekhan, and Mishti. These five collectively are known as the Samil clans. When we annexed the Kohat district we found it convenient in our turn to administer the Miranzai Valley and deal with the neighbouring tribes through the Khan, or head of this family. The first man we recognised as Khan was murdered a few years later, in 1855, by a relation, and the then Deputy-Commissioner, Captain Coke, not liking the arrangement, refused to put one of the family in his place; and this led to a struggle between the Deputy-Commissioner and Muzaffar Khan, a younger brother of the murdered man, in which the latter won, for the Commissioner, Colonel Herbert Edwards, overruled Captain Coke, and appointed Muzaffar Khan to be Khan of Hangu. Captain Coke then found his position as Deputy-Commissioner unbearable, and resigned civil employ.

From that time up to last year Muzaffar Khan continued to be Khan of Hangu, and also Political Agent for dealing with the neighbouring independent Samil clans.

It will be understood that he held a position dangerously strong, too strong to fit in easily with our system of administration. It has been necessary to go somewhat into detail with regard to the history of the Hangu family, as the late troubles on the Miranzai frontier have been largely due to the intrigues of Muzaffar Khan and his sons.

With the exception of a brilliant little dash made in September, 1855, up the southern face of the Samana, against the Rabia Khel settlements at and near Sangar on the crest of the range, the memory of which remains with only a few grey-beards, we had not come into contact with any of the Orakzai clans on the Miranzai border until last January. It must not, however, be supposed that the conduct of

those clans had given no cause of complaint all that time; on the contrary, British subjects in Miranzai had been murdered, their cattle carried off, and raids had been made on peaceful villages; and it was only the dislike of a costly punitive expedition which prevented the Government of India from sending troops into their country long ago. During the Afghan War they committed raids on our convoys proceeding to the Kuram Valley, in one of which, at Mazam Talao, on the 4th November, 1879, they killed thirteen and wounded sixteen British subjects, chiefly unarmed coolies and travellers; and in another, on the 5th August of the following year, they raided on Bagatukh, near Hangu, killing six and wounding three of our Miranzai subjects. Besides these, numerous other raids were committed, and their conduct generally was so outrageous that it was proposed, on the termination of the Afghan War, to send a force into their country to punish them; but unfortunately this intention was abandoned, and Miranzai continued to suffer at the hands of its hill neighbours.

The local authorities from time to time urged the necessity of a punitive expedition, but nothing was done, and this unsatisfactory state of things continued, the principal offenders being the Samil clans, under the Khan of Hangu, and the Akhel section belonging to the Gar faction.

Of the Samil clans the worst behaved was the Rabia Khel, and at the beginning of 1888, this section under the leadership of Malik Makhmaddin, a notorious robber chief, broke out into open hostilities, and within a few weeks committed eight raids on British territory, and treated all demands of the Government with defiance.

In July, 1889, the Lieutenant-Governor of the Punjab, in submitting the correspondence regarding the unsatisfactory state of this frontier to the Government of India, observed that the state of border crime in recent years along the Miranzai Valley had been a scandal and a source of much injury and alarm to British subjects, and of trouble to the administration, and that strong measures would have to be taken to produce improvement. The Government of India were, however, still unwilling to proceed to extreme measures. But forbearance, as is always the case in dealing with these half-savage frontier tribes, was construed by them as weakness, and they continued to commit raids and outrages on British territory.

It was also found that Muzaffar Khan, of Hangu, was intriguing with the Samil clans and encouraging them in their hostile attitude. He was accordingly removed in June, 1890, from his post, and departed with his family to Abbotabad, and subsequently to Lahore, and the tribes were told that he would never be allowed to return to his appointment. The Akhel section in the meanwhile paid up the fines outstanding against them, and delivered up two notorious outlaws, who had taken refuge with them, but the Samil clans absolutely declined to take any steps to pay up their fines. Nothing therefore remained but to coerce them into submission. A punitive expedition was accordingly sanctioned, and it was decided to take advantage of this to assert our claim, which had lain dormant for so many years, to the

crest of the Samana as our boundary, and to build posts there, in order to prevent raiding on the part of these tribes in the future.

In addition to the Samil clans of the Khanki Valley, measures were to be taken to coerce the small Sturi Khel section living in the Mastura Valley, against which we also had some unsettled claims, but this was to be undertaken as a separate operation, after the Samil clans had been dealt with.

The time selected for the expedition was January, when all the tribes would be down in their winter settlements, and the snow on the high hills would prevent the Afridis from giving aid. The command was entrusted to Brigadier-General Sir William Lockhart, commanding the Punjab Frontier Force, an officer of great experience, and thoroughly acquainted with frontier warfare.

The force, which was officially designated the Miranzai Field Force, but would perhaps more properly have been styled the Orakzai Field Force, was composed of the following troops:—two squadrons native cavalry, two native mountain batteries, one company sappers and miners, and seven native infantry battalions, and was divided into three columns under the commands of Colonels Bruce, Turner, and Brownlow respectively.

This force was concentrated at Kohat by the 12th January, and its advance across the border was ordered for the 19th. Heavy rain, however, delayed the forward movement, which did not take place till the 26th.

A reconnaissance in force was made on the 24th January up the Khanki Valley as far as Gwada and Jandasam, the headquarters of Makhmaddin, the principal Rabia Khel, chief and leader of the opposition, the reconnoitring party being fired on as they retired from these villages without, however, suffering loss. On the 26th, the 1st column under Colonel Bruce advanced from Shahu Khel up the Khanki Valley, as far as Khaori, while the 2nd column under Colonel Turner, crossed the Samana Range by the Saifal Darra route to cover the advance of the 1st column through the defile west of Khaori on the following day. This was effected without opposition, and the two columns both advanced to Gwada on the 27th. Here they were joined by the 3rd column under Colonel Brownlow on the 29th. This column crossed the Samana from Darband by the same route as that followed by the 2nd column. The whole force was thus concentrated at Gwada and Jandasam on the 29th January.

No opposition had been offered, and the Samil clans of the Khanki Valley, namely Rabia Khel, Mamazai (Daradar), and Mishti had with the exception of Makhmaddin's section of the Rabia Khel, all come in and made their submission. The next few days were spent in exploring the country and inflicting punishment on the recalcitrant section. The towns and defences of Gwada, Jandasam, Inzaur, and Ghuzgor, all belonging to Makhmaddin, were destroyed.

On the 4th February, General Lockhart, taking with him the 2nd column, moved down the Khanki and visited the Shekhan country, establishing his headquarters at Dran, the principal village of the Shekhan clan, situated in the picturesque Laghardarra Valley. As

the Shekan section paid up their fines, and offered no opposition, further punishment was not inflicted on them, and the force returned to British territory.

It now only remained to deal with the Sturi Khel. For this purpose Sir William Lockhart, taking with him the 3rd column, crossed the Zera Pass from Bar Marai on the 10th, and encamped at Zera in the Mastura Valley.

The height of this pass is 4,450 feet, the road was bad, and snow fell from noon until dark, the result being that the rear guard did not arrive in camp at Zera until twenty-six hours after the advanced guard had moved off from Bar Marai, one regiment being out all night on the crest of the pass. The Sturi Khel, as the force advanced, came into camp and agreed to pay up all the fines outstanding against them, so that no punitive measures were necessary in respect of that section. It was, however, decided to visit their settlements in the Mastura, and a small column marched through their country as far as its western limit. The valley was under snow, and the people were in their villages. No opposition was offered, and the force returned to British territory on the 12th February.

General Lockhart then proceeded to the Samana to select sites for the proposed posts on the crest, and orders having been given for their construction and for the necessary roads being made to connect them with the Miranzai Valley, the force was withdrawn, two regiments of infantry and two guns being left in the Khanki Valley at Gwada until a final settlement with the tribes should be arrived at.

On the 17th February Makhmaddin came in and surrendered himself, thus completing the work of the expedition.

Although there had practically been no opposition, the troops suffered considerable hardships during this short campaign; the force had crossed the frontier in rain, which soon turned to snow, and as a result a large number of cases of frost-bite and pneumonia occurred among the troops and followers.

At the beginning of March the two infantry regiments, and two guns at Gwada were withdrawn to British territory, and the whole force was broken up; the 29th Bengal Infantry, subsequently reinforced by a wing of the 3rd Sikh Infantry, being left to cover the working parties on the Samana.

Although the Samil clans had agreed to the terms imposed upon them and complied with all our demands, rumours were current that there was a strong feeling among the Orakzai tribe generally against the construction of the posts on the crest of the Samana, and also against the demand for revenue from the Rabia Khel villages on its southern slopes.

Moreover, the Samil clans were taunted with cowardice by their neighbours for having given in so ignominiously and abandoned the crest of the Samana without a struggle, and they were urged to try and do something to retrieve their reputation.

Meanwhile, road making was being rapidly pushed on, and to all outward appearances the tribes seemed to have accepted the inevitable, and showed no signs of any intention of committing themselves to

hostilities. On the morning of the 4th April the guards to the working parties went out as usual. A little after 10 o'clock shots were heard at Balamín, where the headquarters of the 29th Bengal Infantry were in camp. All available men were at once moved out by Colonel Reid, commanding the 29th Bengal Infantry, and as they marched off an overseer of the Public Works Department was met galloping in, who stated that the guards had been rushed and either killed or driven off the Samana. Colonel Reid accordingly pushed rapidly forward and met the enemy almost at the foot of the spur running down from Sangar, and steadily drove them back; but as Sangar itself was found to be held in great force by the tribesmen it was impossible to drive them off with the small force at his command, and as evening fell, the 29th had to be withdrawn to Balamín, the enemy following up the troops almost to the plain. In the meanwhile, reinforcements, under Captain Fasken, 3rd Sikh Infantry, had moved out from Darband and reinforced Tsalai, a walled-in enclosure with a tower in one corner.

On the morning of the 5th, Colonel Reid, taking with him two companies, proceeded to Tsalai, the only post on the Samana still held by our troops; but the enemy being in force, and there being absolutely no water at or in its immediate neighbourhood, it was decided to abandon it. Owing to the configuration of the ground the retirement was effected without being noticed at once by the enemy. When it was discovered, the tribesmen swooped down with yells and beating of drums until checked at the Torkhai gorge by the steady volleys of the 3rd Sikh and 29th Bengal Infantry. It was now dark, and the camp at Darband had been rapidly shifted back from the foot of the hills, which disconcerted the plans of the enemy, who being unable to find out its new position, after destroying a few tents still left on the site of the old camp, retired to Tsalai.

The attack on the guards was, as might be expected when Pathans are concerned, made by treachery. The whole of the Rabia Khel collected on the north side of the Samana, while some of their number, who had arranged to get themselves taken on as labourers on the road, suddenly turned on the guard of one havildar and twelve men, who were protecting them, and killed seven; the remainder escaping to Tsalai, which was held by a few Border Military Police. The enemy in reserve on the northern slopes then poured over the crest, and fighting became general from Sangar to Gulistan.

Previous to this a picquet of eight men of the 29th Bengal Infantry at Tangai had also been attacked by stratagem. The villagers who had all along pretended to be on friendly terms with the soldiers drove their cattle past the picquet, having arms concealed under their blankets. They talked and chatted with the men as usual, and then, suddenly throwing off their blankets, set on them, killed one of their number, wounded two others, and secured six rifles. Of the remainder, one man, Sepoy Diwan Singh, whose name deserves to be specially recorded, displayed great gallantry in defending a wounded comrade, and in keeping the enemy at bay until succour arrived; while another, Sepoy Jaimal Singh, also exhibited the dogged

courage of the Sikh in carrying off, under a heavy fire, the body of Sepoy Rur Singh, who had been killed. Both these men subsequently received the Order of Merit for their gallant conduct on this occasion.

Our total losses during the attack on the guards and the subsequent fighting on the 4th April were fourteen killed and seven wounded, all of the 29th Bengal Infantry. The enemy was known to have lost several men of influence.

The abandonment of the crest of the Samana by our troops was a misfortune, but under the circumstances could not be avoided. The effect on the enemy was most inspiring, and further encouraged them in the belief in their own power. The rising had now become general, and reports estimated the enemy's numbers at 16,000, including not only all the Orakzai clans of the Khanki Valley, but a certain number of Afridis, under the leadership of Mir Bashar, a well-known firebrand, who during the late Afghan War for a short time assumed the title of "King of Tirah," and gave some trouble in the Khaibar, and who is at the present time in possession of a pension granted to him by the Amir of Kabul. This man commenced to preach a "jihad" (or religious war), and in this was joined by several well-known *mullas*, who sought to raise the fanaticism of the tribes against the British, the result being that a formidable coalition of all the Orakzai and some of the Afridi clans was formed to oppose any attempt to retake the Samana.

On the morning of the 6th April, reinforcements began to arrive at Darband from Kohat, and on the evening of the 7th, General Sir William Lockhart arrived at the latter station, and assumed command of the field force. Further reinforcements were meanwhile being pushed up from India as quickly as possible, the 6th Punjab Infantry marching from Bannu to Kohat, 80 miles, in as many hours, and No. 5 Company Bengal Sappers and Miners covering the 56 miles from Khushalgarh to Hangu in forty hours. There was, however, some delay in pushing on troops beyond Kohat, as transport and supplies had to be collected from a distance.

On the night of the 7th a few shots were fired into the camp at Balamian, and on the 8th April a small party of the 1st Punjab Infantry was attacked near Hangu, and the non-commissioned officer in command was severely wounded. On the 9th the troops at Balamian were withdrawn to Darband, and an attack was made on that camp on the night of the 10th, the enemy's numbers being estimated at about 1,000 men. The attack was beaten off without loss, and the tribesmen did not subsequently venture down from the crest of the Samana in any numbers. On the 11th, however, two sowars of the 5th Punjab Cavalry were fired on between Kohat and Hangu, one being killed and the other dangerously wounded.

The troops had meanwhile been pushed forward, and by the 16th April the whole force, numbering 7,300 of all ranks, under Sir William Lockhart, who had been ordered up to take the command immediately the news of the outbreak had been received, was concentrated at Hangu and Darband. This force consisted of one

British mountain battery, one British infantry battalion (King's Royal Rifles), six squadrons native cavalry, one and a-half native mountain batteries, half native garrison battery, one company sappers and miners, and nine battalions native infantry; and was divided into three columns. The 1st column, under Colonel Sym, C.B., and the cavalry were at Hangu; and the 2nd and 3rd columns, under Colonels Turner and Brownlow respectively, were at Darband.

The orders received by General Lockhart were to clear the Samana range of the enemy, put down the hostile coalition of tribes, and protect the working parties making the proposed roads and posts. At daybreak on the morning of the 17th, the 1st column accompanied by the General and staff advanced from Hangu and gained the crest of the Samana at Lakka without opposition. From here signalling communication was opened with the other columns at Darband, and General Lockhart ordered the 2nd column to ascend to the crest at the Darband Kotal, and the 3rd column to move to Pat Darband, and then advance up the Samana to Sangar. These orders having been given, the 1st column continued to advance along the crest from Lakka, meeting the 2nd column at the Darband Kotal. This latter column, under Colonel Turner, was then ordered to descend to Gwada on the Khanki, by the Saifal Darra road. This road, as well as that on the crest, was found to have been much broken up by the enemy.

Up to this point no opposition had been offered, but when the 1st column continued its advance along the crest towards Tsalai, it was found that the enemy was occupying that village. The mountain guns were accordingly brought into action, and under their cover the place was assaulted and carried, the King's Royal Rifles leading the attack. During this operation, Colonel Cramer, commanding the King's Royal Rifles, and Major Egerton, Assistant Adjutant-General to the Force, were both severely wounded. Besides these casualties, the King's Royal Rifles had four men wounded, one dangerously; and Major Egerton's orderly, a lance-daffadar of the 3rd Punjab Cavalry, was also severely wounded. Gogra and Sangar were next carried by the 1st column without further loss, and the latter place was reached simultaneously with the 3rd column, which had advanced up the Pat Darband road. This column was opposed, during its advance, and succeeded in inflicting some loss on the enemy. The 1st and 3rd columns bivouacked for the night at Sangar. The heat throughout the day was very great, the troops suffering much from thirst, and this was intensified by the difficulty in getting water at Sangar. In the meanwhile the 2nd column had established itself at Gwada, which is immediately below Sangar, and in sight of it. Colonel Turner had, however, to fight his way, and had one man killed and four wounded; one dangerously. The cavalry had moved round from Hangu by Shahu Khel, after the 1st column had gained the crest at Lakka, and had advanced up the Khanki Valley, and having joined hands with Colonel Turner, had returned to Hangu by the Saifal Darra road. They were fired on during the day, but suffered no loss.

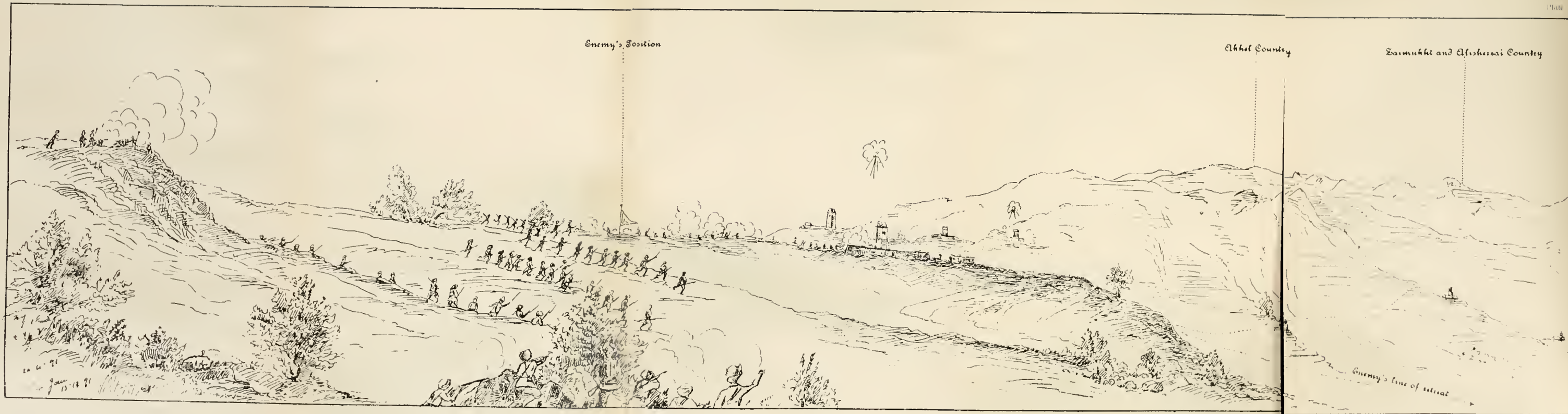
At 7 a.m. on the morning of the 18th, the 1st and 3rd columns continued the advance along the crest towards Sartop, which was held by the enemy. The 3rd column made the direct attack, while the 1st column, accompanied by General Lockhart and staff, moved round by the left, and attacked the enemy's position from that flank. At 8 a.m. the village had been cleared, and the place occupied by our troops, with a loss of one man killed and one Officer and seven men wounded. A halt was here ordered to enable the troops to get water from the spring below the village, as some of the men had been twenty-four hours without it, and they were exhausted by the heat of the sun. At 11 a.m. the advance was continued, and the Mastan plateau was occupied after slight opposition. The 3rd column was then left to hold this plateau, while the 1st column returned to Sangar.

The 2nd column at Gwada was employed this day in destroying the defences of the Rabia Khel village of Dzond. During the day they lost one man killed and five men wounded; four dangerously. On the 19th this column returned to the crest, and the disposition of the force on that date was thus: 1st and 2nd columns at Sangar, and 3rd column at Mastan.

On the evening of the 19th a report was received from Mastan that a convoy which had left Sangar for that place in the afternoon had been attacked on the road, and only half of it had arrived. Troops were accordingly sent out, and the enemy was beaten off, thus enabling the remainder of the convoy to reach Mastan in safety.

During the 19th the enemy had been collecting in large numbers in the neighbourhood of the Mastan plateau, and continued throughout the day to fire and worry the picquets, especially that over the water. When the picquets were withdrawn in the evening, the enemy followed up and attacked the camp with great determination. They succeeded in the dark in getting up so close to the two advanced picquets that they were able to throw stones into the breastworks. On several occasions it was evident by their hoarse shouts and screams that they were trying to encourage each other to rush the picquets; but by degrees they became discouraged, and about 10 p.m. they withdrew, and all became quiet and remained so for the rest of the night. Our losses during the day had been one native Officer and two men killed, and one Officer, one native Officer, and two men wounded.

On the morning of the 20th a report having been received from Colonel Brownlow that the enemy was still collected in large numbers at Saragarhi and Ghuztang, reinforcements consisting of one mountain battery and three infantry regiments were sent from Sangar, and Colonel Brownlow was ordered to clear off the enemy from the neighbourhood of his camp. About 2 p.m., the reinforcements having arrived, the attack on the Saragarhi villages was made (see accompanying sketch). The 5th Gurkhas led the attack with the King's Royal Rifles in support on the right, and the 2nd Punjab Infantry in reserve. The advance, covered by the fire of the Peshawar Mountain Battery, was made in most dashing style. The Gurkhas



J. R. Mowbray 1894
Eds J. J. J.

THE ACTION OF MASTAN, 20TH APRIL 1891

Attack on the Saragathi Villages.

(Ed.) F. C. Mowbray Captain
22nd Punjab Infantry.



J. B., November 1894.
Exd J. A. A.

moved forward with great rapidity, and getting to close quarters, inflicted severe punishment on the tribesmen. At 3 p.m. the villages of Saragarhi were in our possession and the enemy scattered and flying in confusion. Simultaneously with this attack the 6th Punjab and 19th Bengal Infantry carried the village of Ghuztang, the enemy making no stand, but flying towards the Khanki. Some sixty dead bodies were left on the ground, and from reports subsequently received, it appears that the enemy's losses amounted to nearly three hundred killed and wounded. Our casualties were only one man of the King's Royal Rifles killed, and one Officer and six men of other corps wounded. All sections of the Orakzai tribe were represented in this engagement.

On the 21st April General Lockhart advanced to Gulistan with the 2nd column under Colonel Turner, and on the following day moved into the Chagru Valley, in which are situated the settlements of the Akhel clan. From the crest of the high hill to the west of Gulistan, these settlements were all visible in the valley below. Retaining the guns and two regiments on the crest of this hill, General Lockhart sent the 1st Punjab Infantry along the ridge to the Chagru Kotal with orders to work down the valley, while the 2nd Punjab Infantry, followed by the 3rd Sikh Infantry, descended towards the Khanki with orders to work up and meet the 1st Punjab Infantry. The enemy opened fire on the 1st Punjab Infantry as it advanced, but this regiment, aided by the guns on the crest, soon cleared out the villages in their front. The 2nd Punjab Infantry reached the bed of the Chagru Stream under cover of a spur running down from the crest, and surprised the enemy before they were able to escape, inflicting heavy loss on them. They then moved up the bed of the stream, covered by the 3rd Sikh Infantry on the right flank, and cleared out the villages, destroying their towers and defences. On the retirement of the troops the enemy was prevented from following up by the fire of the mountain guns, which had been moved to a point commanding the opposite side of the valley, and the force returned to camp without molestation. Large bodies of the tribesmen were seen about the hills and down in the valley, but these were dispersed by the fire of the guns, and by infantry volleys. Our losses during the day were one man killed and thirteen wounded. The enemy had between fifty and sixty killed, but the number of the wounded could not be ascertained.

On the morning of the 23rd a large gathering, with standards, having collected near the village of Margharu, about two miles from Gulistan, General Lockhart moved out of camp to attack their position. Stone breastworks, or "sangars," had been thrown up just beyond the village; and from here the enemy opened fire on the advancing troops, but after an engagement, lasting half-an-hour, the position was carried by the 15th Sikhs, who led the attack, the enemy dispersing down the reverse slopes of the hill under a heavy artillery and infantry fire. The force then moved down the spur and destroyed the tower and defences of the village of Talli, out of which the tribesmen had advanced with standards on the previous day.

This having been done, the troops returned to camp without a shot being fired as they retired, a sure sign with Afghans that they have been thoroughly cowed. A characteristic incident of Pathan warfare occurred at the village of Margharu. A "ghazi," or Mohammedan religious fanatic, had concealed himself among the ruins of this village, and as the troops passed, he suddenly rushed out and tried to cut down a Sikh sepoy, but was fortunately not able to do so before he himself was killed. Our losses during the day were one man killed and one native Officer and five men wounded. A strong contingent of Afridis fought in the ranks of the enemy during the day; but this was the only occasion on which they openly opposed us, and after this action they went off to their homes in Tirah, and did not again return.

Meanwhile, the punishment of the Rabia Khel continued. On the 21st Colonel Brownlow blew up the towers of the Ibrahim Khel hamlets; and on the 22nd a small column, under Colonel Reid, destroyed the defences of Bazai.

On the night of the 22nd April the post at Chilibagh, between Kohat and Hangu, was fired into; and on the morning of the 23rd an attack was made upon a convoy near the Darband Kotal, in which we lost four men killed and three wounded, and at the same time a number of mules were killed, others being carried off. General Lockhart therefore determined to move a column into the country of the Shekhan and Mamazai (Daradar), as those clans were principally concerned in the above attacks. Accordingly, on the 27th, he moved to Hangu, and thence marched with the 1st column, under Colonel Sym, *via* Shahu Khel to Dran, the headquarters of the Shekhan tribe, which was reached on the 30th April.

This village was occupied after slight opposition, one sepoy being wounded. From here the force advanced into the country of the Mamazai (Daradar), meeting with no opposition. The towers of the principal villages of these tribes were destroyed as a punishment for their misconduct; and on the 4th May the force returned to the crest of the Samana.

All opposition had now ceased, and the tribes were anxious to be allowed to come in and make their submission. They were, however, informed that before they could be permitted to do this, they must restore the whole of the Government property in their possession, including the rifles taken from the men of the 29th Bengal Infantry killed on the 4th April. On the 7th May deputations from all five Samil clans came into camp at Gulistan, bringing with them the Government property demanded. Their attitude was thoroughly submissive, and they expressed to General Lockhart their readiness to accept all the conditions imposed upon them relative to the Samana, acknowledging our right to build posts on the crest, and undertaking to pay revenue for their villages on the southern slopes of the range. As, however, the Mishti clan had not received any punishment for their share in the outbreak, General Lockhart informed the deputations that he intended to destroy the towers of Kandi Mishti, and directed them to accompany him to witness the punishment. This village, owing to its supposed inaccessibility, had, in times past, been

the resort of the bad characters of the Mishti clan, and it was therefore considered desirable to show that we had the power to reach them if necessary.

Accordingly, taking with him a force sufficient to overcome any possible opposition, Sir William Lockhart advanced on the 10th May from Gulistan by the Chagru route into the Khanki Valley, and on the same day destroyed the towers of Kandi Mishti, returning in the evening to Karappa, the headquarters of the Akhel. This last named clan after the severe punishment it had received on the 22nd and 23rd April, had come in and made complete submission, and the people had returned to their villages.

At Karappa deputations from the remaining Orakzai clans of the Khanki Valley, namely, Ali Khel, Mamuzai, and Alisherzai, came in and were received by General Lockhart, who informed them that he proposed to visit their country, but that if they abstained from opposition, no damage would be done to their villages or crops, but that if they opposed our troops in any way, they would be severely punished.

The force therefore advanced to Sadarai on the 12th May, and the following day to Khanki Bazar, the headquarters of the Mamuzai, passing *en route* Starkili, the principal village of the Alisherzai.

From Khanki Bazar the crest of the pass between the Khanki and Kurmana Valleys, was visited and the survey of this country, which had never previously been visited by any European, was connected on to the work done by the survey officers in the Kuram Valley during the Afghan war. No opposition was met with, and General Lockhart left Khanki Bazar on the 14th, returning to the crest of the Samana on the 15th May.

The work of the expedition had thus been most successfully brought to a conclusion. The Samana range had been retaken, the tribes who had opposed us had been punished, their countries had been visited and they had all submitted and accepted in full the terms imposed upon them. This result must be attributed to the admirable conduct of the operations by Sir William Lockhart, and more especially to the fact that from the 17th April, the day on which the Samana was re-occupied, the movements of the troops had been so rapid and ceaseless, that the tribesmen had been constantly harassed and driven from place to place, and had never been allowed to remain collected in large numbers. This undoubtedly disheartened them, and combined with the heavy losses they had sustained, caused them to give up the struggle which they found to be hopeless. This success of our arms was not, however, so cheaply earned as is often the case in these frontier expeditions, as is seen from the fact that our losses in killed and wounded exceeded one hundred, and included five British and three native Officers.

The construction of the posts is now being rapidly pushed forward, and until these are completed, a force of one mountain battery, and three native infantry battalions, is being left on the crest of the Samana, to prevent any possible repetition of the outbreak of the 4th April. These posts, which are located at Dhar (near Sangar), Mastan, Gulistan, and Shinawari, are designed to hold altogether eight companies

of infantry, and they will, it is hoped, when completed, entirely put a stop to raids on the Miranzai Valley, similar to those which led to the expedition in January last. It is thought that it may eventually be found possible to entrust the garrisoning of these posts to Border Military Police, and tribal levies. As a beginning in this direction, a few small posts in addition to those already mentioned are being constructed on the crest of the Samana to the east of Sangar, and these when completed will be held by police and levies.

The boundary line along the crest, now marked out by pillars, includes sufficient ground in the neighbourhood of Mastan for a site suitable for a cantonment, with an elevation of over 6,000 feet, should such at any future time be contemplated.

One very important consequence of the recent operations as regards the future peace of the Miranzai border lies in the fact that advantage has been taken of the present opportunity to sweep away the last vestige of the pernicious system of "middlemen." This system, doubtless useful in its time, has now been generally condemned, and step by step the middlemen (the irresponsible local chiefs who formed the channel of communication between the British Government and the tribes, and who would not have been Pathans if they had not abused the advantage this gave them) have been superseded by direct communication with the frontier tribes, till in Miranzai, in the person of the Khan of Hangu, there existed the almost solitary survival of the middleman. This chief, as has already been seen, is at the present time detained as a political prisoner in Lahore, and will never be allowed to return to that position which he held for thirty-five years, and which he used (more especially of late years) for carrying on intrigues among the independent tribes for his own ends.

Another result of the late operations is that a survey has been made of the country beyond the crest of the Samana, hitherto a sealed book, and much useful information has been collected, not the least of which is the knowledge that the routes into Afridi Tirah from the south are much easier than was previously supposed.

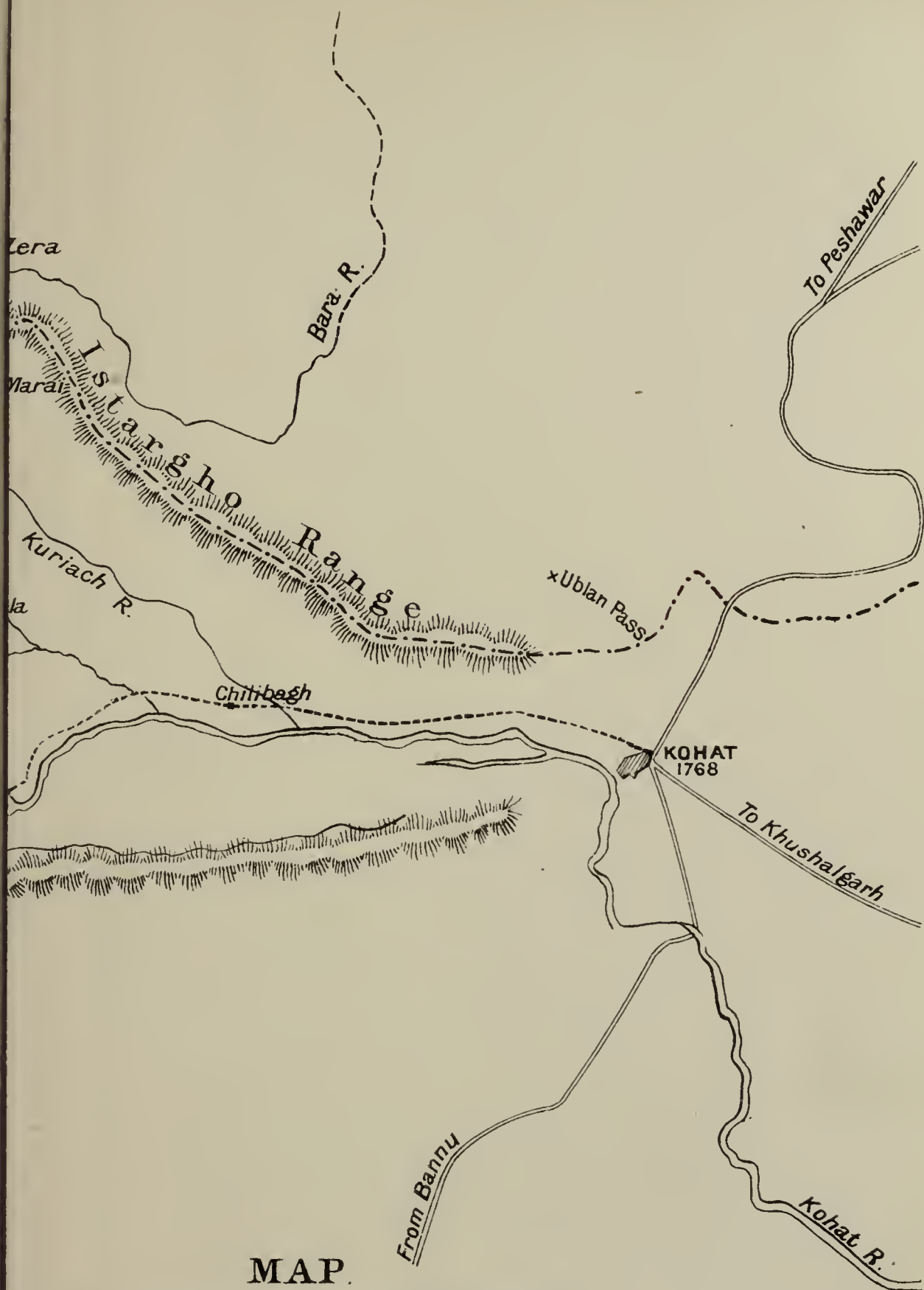
It may also be remarked that the two expeditions into the Orakzai country this year have afforded a further illustration, if such were needed, of the admirable qualities of the native as well as of the British soldier under the most adverse circumstances, when commanded by a skilful and popular leader. Difficulties, whether arising from a winter of unexampled rigour as in the first expedition, or from heat and want of water as in the second, have alike been overcome, and the tribes have been taught the lesson that their rugged and difficult hills are no longer a safe protection against troops armed with breech-loaders, provided with mountain guns, and accompanied by sappers who can blast roads out of the solid rock.

Besides these special results, the late operations teach us some lessons of more general interest.

Since the Jowaki campaign in 1877-78 a revolution has taken place in the matter of frontier expeditions, and the ill-armed tribesmen are now beginning to see that it is certain destruction to try and stand up against breech-loaders. In the old days of the Brown Bess,

things were different, and they were then able to meet us with a weapon which, if not so good in some respects, yet in the matter of range was equal to, if not better than, our own, and at Ambela they were able to inflict heavy losses on our troops. The advent of the Snider and then of the Martini has, however, altered all this, and now they are beginning to understand that to be shot down at 1,000 yards or more by breech-loaders when your own weapon is a muzzle-loader, which may possibly carry an erratic bullet 300 yards, is a one-sided business, and a game which does not pay. At Kotkai, in 1888, a band of *ghazis*, who tried the old tactics of charging sword in hand, were mown down by the terrific fire of our breechloaders, and not a man escaped. No attempt was made to repeat that experiment. Again, in the late expedition, once and only once did the enemy attempt to stand in the open, but the punishment they received will effectually deter them from ever trying to repeat such tactics on the Miranzai border. During the recent Black Mountain expedition the tribes, after their experience of 1888, openly gave out that it was useless to try and oppose our troops in the open, and the leader of the Hindustani fanatics issued orders to his followers not to attempt to do so, but to confine themselves to night attacks and guerilla warfare. It is now, therefore, becoming a safe maxim that if a Pathan tribe has once fairly stood up to fight breech-loaders, it will never do so again.

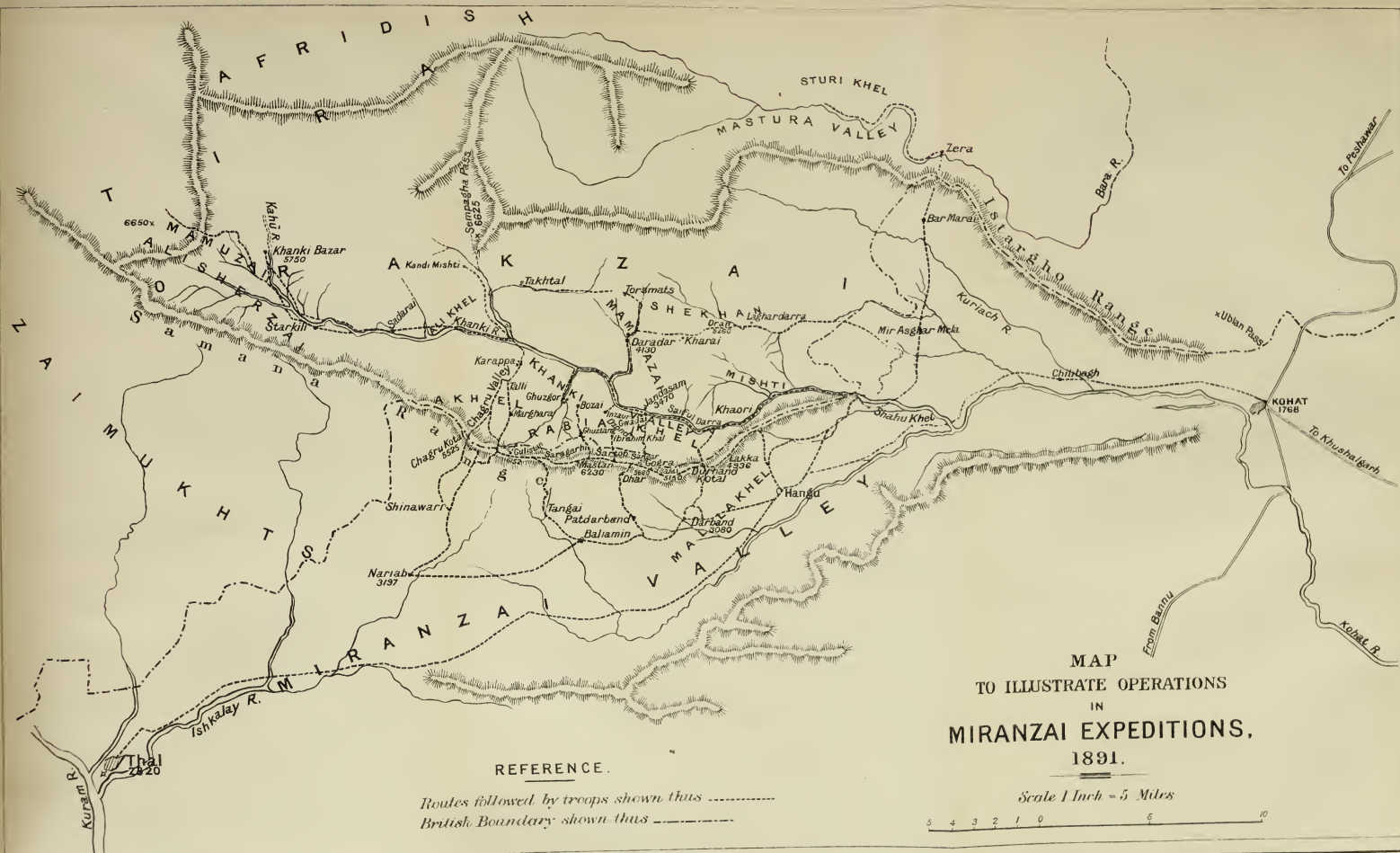
What perhaps they dread even more than our Martinis is the terrible screw gun, which can destroy them at 2,000 yards and more. The tribesmen consider that the employment of such weapons is not "playing fair," and the first round from a screw gun usually results in a general stampede of the enemy. It seems a vast pity that it should be necessary at all to resort to punitive expeditions against these tribes, and anyone who has seen these brave and manly mountaineers lying stark and stiff on the hillside, killed by our modern weapons of precision, cannot but feel pity for them; and how much more satisfactory it would be if this splendid material could be utilised to supply the much-needed recruits for our native army. There can be no question that our object should be to make friends and not enemies of these Pathan tribes, and some change in the traditional ostrich policy of the Punjab frontier is absolutely necessary if we wish to have the border tribes on our side in the event of our power in India being threatened from without. What these measures should be and how they ought to be carried out is beyond the province of this paper, and is a question for the political rather than for the military authorities to decide. Something has been done of late years in this direction, but much more still remains to be accomplished before we can be said to have gained a thorough hold over our turbulent neighbours on the north-west frontier.



MAP.
TO ILLUSTRATE OPERATIONS
IN
MIRANZAI EXPEDITIONS,
1891.

Scale 1 Inch = 5 Miles





DISTANT SIGNALLING IN THE ROYAL NAVY.

[*Note.*—The author of this paper kindly wrote it at my request, and, as there is a good deal in it on a subject of almost paramount importance in war-time, I have obtained his permission to publish it in our Journal.—P. H. COLOMB.]

ADMIRABLE as our system of signalling is in the Royal Navy, yet no efficient method of distant signalling in daylight has been established.

In this paper I shall try to describe the methods which have been used, and also venture some suggestions for their improvement.

At present, there seems to be no effective means of communication outside the range and visibility of coloured flags. Hitherto attempts have been by means of the shapes of flags and balls, and by the principle of collapsing drums.

As long distances preclude the possibility of coloured signs (flags), the only remaining system must be by some code where “shapes” come into play. During our summer manœuvres codes have been arranged where the shapes of flags and balls have been used. In this method, which is also that of the mercantile marine, the ball is the characteristic when it is used in conjunction with square flags and pendants.

The limited size of our signalling flags, and the smallness of the balls supplied, renders their range too limited. This objection—namely, the size of the apparatus—is met in the Navy by substituting foreign ensigns for flags, and using the collapsing drum for the ball. Pendants can be substituted by double, or treble, folding the ensigns.

The following table will show the comparative sizes of the apparatus:—

	sq. ft.		sq. ft.
Battle-ship, signal flag	99	Foreign ensign	220 (about)
„ pendant	88	„ „ (double	
Ball.....	7	folded)	110
		„ „ (treble	
		folded)	73
		Collapsing drum	10

There are several objections to this method, of which the chief seem to be:—

- (1.) The very limited number of signals that can be made.
- (2.) Their dependence on a convenient wind to render them discernible.

(1.) Having only the three elements, ball, flag, and pendant, the

number of combinations is necessarily limited. Considering the comparative small lateral area of the drum, this factor is not very powerful; but a code can easily be arranged of thirty signals, in which pendants and flags are solely used. Calling a pendant a "long," and a flag a "short," the Morse code letters can be made and a special signification given to each. These signals would consist—2 of one element, 4 of two elements, 8 of three elements, and 16 of four elements. The twenty-six Morse code letters would be embodied, besides the opposites of B, C, H, and Z. Beyond the fact that these signals would be easy to read when seen, the scheme does not commend itself.

(2.) Unless a wind favourable to the reader is blowing, any system of flag-signalling at distances is fruitless. It is absolutely necessary that the flags be, more or less, fully exposed normally to the reader's line of vision. If the speed and course of the signalling ship be the same as the wind, then the flags will experience a calm. These conditions are unfrequent, and might doubtless be overcome by an alteration of the signalling ship's course. Even with a wind blowing, the chances are that the bunting is more or less head or fly-on to the reader. This, again, might be overcome by an alteration of course. This alternative (the alteration of course), however, would probably be out of the question; therefore, some better method of distant communication must be found, which should fulfil the following conditions:—

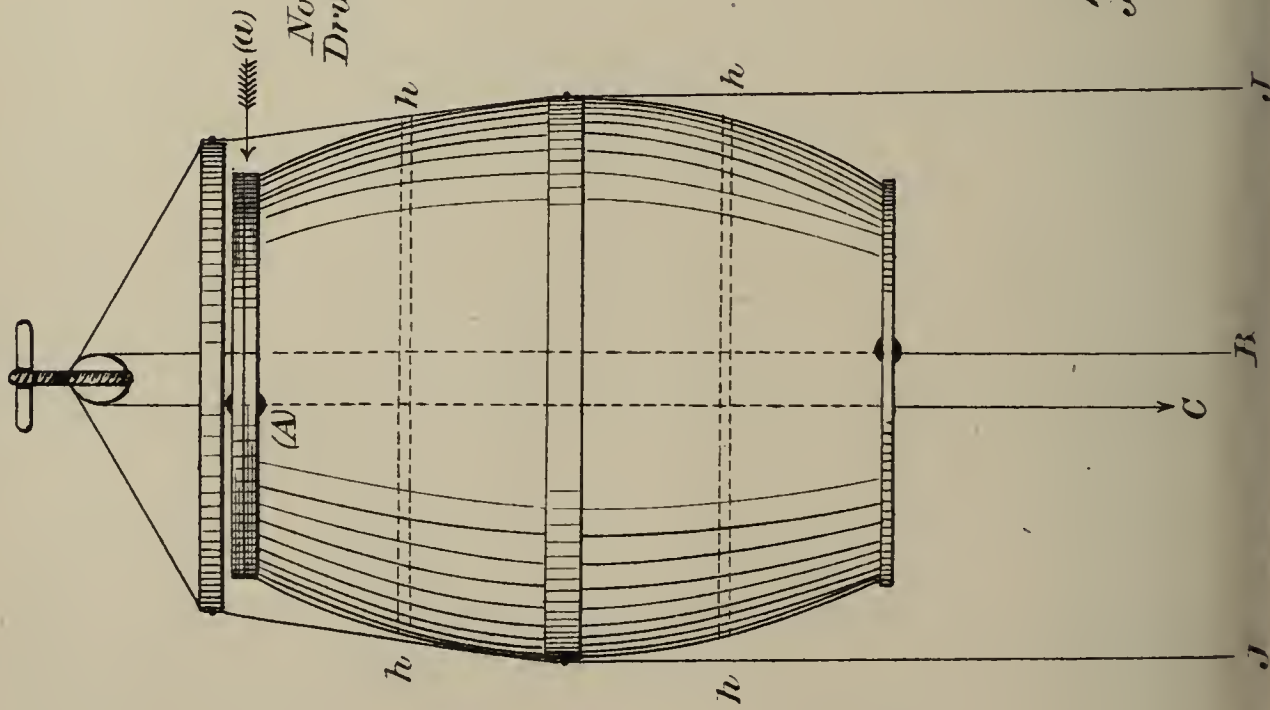
1. To be visible from any quarter.
2. To be independent of colour.
3. To be simple.

Assuming that flag-signalling has been found wanting, we are driven to the flashing and semaphore systems.

Flashing, by which is meant any method of signalling by "dots" and "dashes," or "shorts" and "longs," has the great advantage of possessing but two simple elements (the "dot" and the "dash"), which can be made by the different periods of space or time in many various ways.

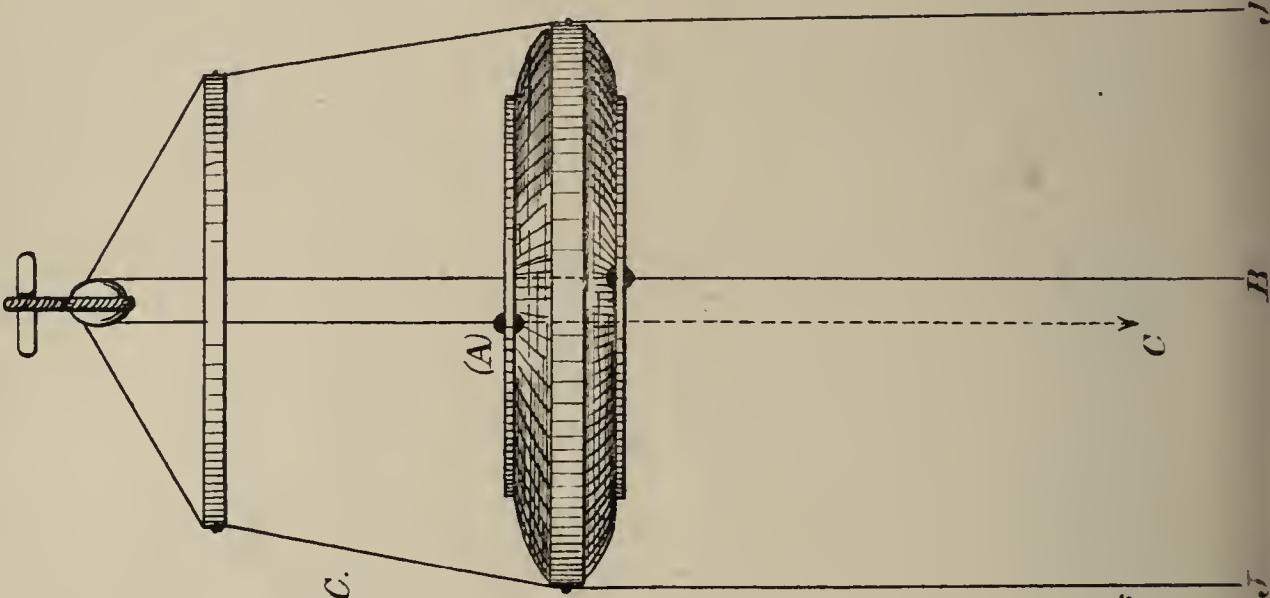
The crudest method of employing the flashing system to distant signalling is by using a large square flag. Dots and dashes are made by hoisting and dipping this flag for short and long periods. The intervals of time should depend on the distance of the reader, and the motion of the ship. The interval of time the flag should be kept at the "dip" (at least 20 ft. below the masthead), should be equal to a "short"; in fact, the units of time to be observed in Morse-making should be strictly adhered to. I have particularly mentioned this unit of time between the elements of a letter, because in flag-waving this unit becomes inappreciable and its existence forgotten, it is fatal to neglect this unit when flashing by dipping and hoisting a flag. At long distances this unit's importance reaches its full value and cannot be dispensed with. I have only observed this method of distant signalling tried twice, but on both occasions this unit of time between the elements of a letter was so

EXPOSED



*Note. In the Admiralty
Drum there is no rope A.C.*

COLLAPSED



*h. h - hoops.
J. J. etc. - steady lines*

curtailed that the distant reading ship often missed the break. At long distances, when using a spy-glass, the strain on your eyes, your constrained position, the motion of the ship, and the accompanying distracting surroundings all combine to prevent you keeping your eyes and concentrated attention a constant fixture on the flag; so, if this unit of time between the elements of a letter is shortened, the reader may just miss it, and amalgamating two separate elements into one thus read nonsense. However, if it is made accurately, its efficiency is still governed by the direction of the wind.

Now, in the collapsing drum, we have an apparatus which is not dependent on the wind, and, owing to its barrel-like shape, it has the advantage of legibility from all points of the compass. By means of these apparatus, which are supplied to H.M.'s ships, we have the only method laid down by our signal books of making distant signals. The drum, when exposed, is 4 feet high, 3 feet 6 inch maximum diameter, and 2 ft. 8 in. at the ends. It collapses into a space of about 8 in.

Our signal books give the following instructions concerning it:—

“The drum is to be hoisted where most convenient not less than 20 feet above the deck, which is a sufficient height for the most distant signals; it is self-collapsing, and is worked by hand.”

The upper hoop (a) is weighted to about 10 lbs. by being made of lead. A glance at the sketch will show how this makes the drum self-collapsing. It requires a 15-lb. pull to expose it. As this drum only shows a lateral surface of a little over 10 square feet, it is clear that its range is not great; especially when it is remembered that a battle-ship's signal flag can show 99 square feet. Notwithstanding the assertion in the Signal Book, actual experience has been sufficient to show that the drum is too small for its object; so much so, that during our summer manœuvres, when the want of an efficient method of distant signalling has been keenly felt, attempts have been made to attain range by making a much larger drum. These attempts, however, have not been successful in obtaining the object in view. All these impromptu attempts were too heavily and clumsily built, and they generally would not collapse properly. Some of them were built using planks of timber, and so little did their designers follow the pattern of the sketch that they were frequently like huge concertinas which required a party of men to work. When signals with these machines were required to be made, the sub. of the watch had to pull this machine up to collapse it. The yeoman of signals gave the necessary orders to procure “shorts” and “longs.” For a time everything might go right, but then, either the yeoman would get mixed, or else the men would get lazy and without any warning take a rest; and so the grand result, though, perhaps, amusing, would result in nothing.

During the manœuvres of 1889 a drum was used in H.M.S. “Colingwood” 8 feet high and 5 feet in diameter. It was built on five hoops kept from bulging in by triangles of timber planks. It weighed over $1\frac{1}{2}$ cwt. and required several men to work. It was considered a failure.

In 1887 a drum of slightly bigger proportions to, and designed on a modified plan of, the Admiralty pattern, was invented and tried by Captain King, of H.M.S. "Sultan."

The Admiralty drum was found not only too small, but at times its collapses were not complete enough and it was also liable to jam from wind pressure when in an exposed condition. The defect of not collapsing properly, *i.e.*, not fulfilling one of its most important functions, is quite sufficient to render the apparatus useless, because, at a distance, it may not be certain whether the drum is intended to be exposed or collapsed. The Admiralty drum, theoretically, ought to collapse into $12\frac{1}{2}$ per cent. (*viz.*, 6 inches) of its exposed surface, which percentage would be sufficient if attained.

These defects were provided against in the "Sultan" drum by :—

- 1st. Increasing its size from 4 ft. \times 3 ft. 6 in. with 2 ft. 8 in. ends to 6 ft. \times 4 ft. 6 in. with 4 ft. ends.
- 2nd. Continuing the rope "C" (see sketch) to the deck.

This drum also differed from the Admiralty drum in its manipulation. The latter collapsed automatically, whilst the "Sultan" drum depended entirely for that on the tension put upon the rope "C." It was found that this way was necessary on account of its increased size, as the following may show. In the Admiralty drum it required a weight of 10 lbs. to overcome the friction of collapsing a lateral area of $12\frac{1}{3}$ square feet, and a pull of 15 lbs. to fully expose it, the extra 5 lbs. being expended to overcome the friction of its working parts. The lateral area of the "Sultan" drum was $25\frac{1}{2}$ square feet or about double that of the Admiralty drum to collapse. Increasing the weight of the upper hoop, in the same proportion, to make it collapse automatically, would require that hoop to be weighted to 20 lbs. and the extra friction of the machine be increased to about 10 lbs. Thus, to expose the "Sultan" drum (if automatically fitted), it would take a pull of about 30 lbs. A signaller would be incapable of keeping up this pull, for any length of time, through a hoist of 3 feet. The Admiralty drum, which is exceedingly tiring to work, requires an expenditure of 30 foot-pounds, and were the "Sultan" drum worked on the same principle it would require about 90 foot-pounds.

By not having a weighted upper hoop, and, in its stead, continuing the rope "C" to the signaller, every exposure and every collapse was made by, and under the direct control of, the signaller.

Thus, by not having a 20-lb. upper hoop, the signaller had to make two of 10 lbs. each, instead of, otherwise, one of 30 lbs. to attain the same result. As the "hoist" and "pull down" are both 3 feet, the foot-pounds to be exerted are 60 in the "Sultan" drum as against 90 were it fitted automatically.

Improvement as the "Sultan" drum undoubtedly was over the Admiralty drum, yet it would not collapse into a lateral space of less than 14 inches, which was too much. This defect seemed to be due to two causes :—

- 1st. There was only one extra hoop between the upper and centre one, which allowed the canvas to bulge out and overlap.
- 2nd. The canvas was too stiff to allow itself to lie snug.

Range trials with this machine were carried out, and it was found that, under favourable conditions of sea and weather, its range was about $5\frac{1}{2}$ miles. Considering its object, this result might fairly rank that drum as a failure. The principle, I think, deserves further experiments by larger drums. I would therefore suggest that a drum be made showing at least 100 square feet lateral area. Stout calico might be substituted for canvas. The correspondingly large stroke might be provided for on the principle of the wheel and axle, where, with a conveniently long lever, the increase of power would compensate the stretch of hoist. Before leaving the subject of collapsing drums it is necessary to complete the observations by a few remarks on its best working position. The Signal Book says: "It should be hoisted where most convenient, 20 feet above the deck." Now, it is very important that any machine for distant signalling should be hoisted in such a position where it would enjoy an unobstructive background from all relative positions of the ship using it. The mast-head is that only place, and a suitable fitting might be found in a light steel cage, capable of being placed over the masthead so as to allow the drum to work inside. No doubt this machine would be very unsightly; it need only be placed there when the occasion arises.

There is another method of flashing which might be employed for distant signalling, namely, the "shutter." In a high wind the drum is very hard to work, and by means of a series of horizontal shutters this difficulty would be obviated; but it seems more than questionable whether its comparatively complicated mechanism would not in itself condemn this method.

From the flashing system we pass to the semaphore, which system possesses qualifications, required in distant signalling, which are not to be found in the flashing system. The most simple signal, or even a letter, made by the flashing system can only be made and then read by watching the *motion* of an object; but the simplest signs made by semaphore consist of *fixed* signs. Flashing is a performance and semaphoring is a result, so to speak. The performance of flashing has to be watched till its completion, but the fixed signs of the semaphore can be read comparatively free of that extreme vigilance and eye-strain necessary for reading a combination of dots and dashes.

Now, our only machine that could possibly be used for this purpose is the topmast semaphore, but, unfortunately, it is not big enough.

These semaphores, which have three arms, are now fitted to our battle-ships and first-class cruisers. They are supplied in two sets, fitted one above the other on the topmast. The upper set of arms is placed high enough to be visible, clear of the funnels and tops, to ships disposed ahead and astern. The lower set of arms face the beam. The arms are 6 ft. long, $6\frac{1}{2}$ in. broad, and are fitted with

cross-pieces projecting from the ends. The object of these cross-pieces is to render the arms more conspicuous, and they are most necessary in a sign involving the vertical position of an arm, because, in that position, the arm is coincident with the mast. Both sets are geared together, and are worked by one set of handles.

During 1887 comparative trials were carried out by Captain King, with a view to testing the relative efficiencies of his drum in the "Sultan" and the topmast semaphore of the "Agincourt." The same message was sent by both ships, with the following results:—The semaphore was nearly twice as fast as the drum, and their respective ranges were computed at 6 miles for the semaphore and 5 miles for the drum. I cannot remember the rate of sending, but I think the drum's speed on that occasion was about four words a minute. The reading from both machines was inaccurate, but reading from the semaphore was worse. This was accounted for in the case of the drum by its position, and in the case of the semaphore by the arms being out of adjustment.

The drum was hoisted on the mizen stay, the "Agincourt" having an oblique view of it. The letters could be read as long as the background was fairly clear, but, owing to the unsteadiness of the "Sultan's" course, her yards and rigging, every now and then, hindered a good view.

A somewhat oblique view of the "Agincourt's" semaphore was visible against a clear sky-line the whole time, but either the letters were formed carelessly or else the arms were out of adjustment. As only 4° separate one letter from another, it is most important that the working parts of the arms should be as free from backlash as possible, and that they should show true with the handles. The arms of the modern topmast semaphores are made of $\frac{1}{16}$ th steel, with an $1\frac{1}{2}$ " \times 1" T-bar; but I think the "Agincourt's" semaphore was of a different pattern, and had arms over 6 ft. long. At any rate, messages by semaphores of that size require accurate making; the letters should be formed slowly and firmly to overcome their tendency, from acquired momentum, to overshoot their intended position.

Now, 6 miles for the topmast semaphore as a range is far too limited for distant signalling, so why not have 12-ft. arms? Could they not be made lighter; is it absolutely necessary that they be made entirely of steel? Nevertheless, heavy or not, this increased size would give the semaphore an immense value. In time of war, when some system of challenging strange ships is so important, where could one find a better method of making a "parole" or "countersign" than by a pre-arranged fixed sign on the semaphore.

To obtain an adequate range of vision for our methods of distant signalling by day, I have suggested a large increase in the size of the apparatus. Now this desired range of vision can be obtained by the *reader* as well as by the *sender*. I have suggested that the sender should increase the size of the drum or the length of his semaphore arms, but this desired range can be met half-way by the reader increasing the magnifying power of his telescope. A telescope of

this description would necessarily be expensive and unwieldy ; but it would pay for itself in the coal it would save. If it is necessary to reconnoitre a strange ship which has hove in sight, you must steam sufficiently close to her to make her out by the telescope, and the more powerful your spy-glass the less distance you will travel, the more time you will save, and the less coal you will burn. This large telescope could be provided with a light and portable tripod rest.

Distant Signalling at Night.

Defective as our day methods may be, the electric light supplies us with an excellent method for signalling to distances at night. For this work the electric search light has no equal. There are three methods of signalling by it on the flashing system:—

- 1st. By waving the beam in a vertical plane.
- 2nd. By means of the obscuring disc fitted in the projector.
- 3rd. By the reflection of the light on a cloud.

To signal by the first method, the beam should be waved in a vertical plane at right angles to the reader. Dots and dashes are made by the periods of time the beam is kept elevated.

If the object for communication is above the horizon, then excellent results can be obtained by means of the obscuring disc in the focus of the projector. I believe this disc is regarded by torpedoists as a nuisance, and is often removed, but, nevertheless, it is most useful for signalling. By pointing your light on the ship you wish to communicate with, and working your disc, signals can be used with far greater rapidity than by the laborious method of waving the beam. Of course, at comparatively short distances the intensity of the light would be too dazzling to the reader, so it should only be used outside the range of our flashing lamps.

In time of war, where some system of challenging ships at a moment's notice is of vital importance, the search light cannot be employed with satisfaction. Not only is it not always ready for instant use, but it seems also to be too much of an advertisement for the ship. To meet this want, the new electric multiple-fibre flashing lamp is especially adapted. In this lamp the flashes are made by a key, which, when pressed, completes the circuit, and the fibres of the lamp are heated to incandescence. The lamp can be placed at the masthead, where it enjoys a clear all-round view. By having keys at convenient places, signals can be *instantly* made, no matter where the ship may be. The candle power of this lamp is 64, so it is most useful where our other lamps are powerless, filling the gap between the ordinary short distance lamps and the search light. For any close-order work this lamp is too slow.

The third method may be useful for signalling to ships below the horizon, or when high land intervenes. I have used the words "*may be useful*," because its success is dependent on the kind of cloud. A round cloud (nimbus) is not much good, as the signaller will

probably be reflecting the light on the side nearest him, which would be invisible to any one situated on the other. A flat cloud (stratus) should be selected. If it is not obtainable, communication might still be established by means of your beam, which should be elevated as high as the projector will admit.

NOTES ON THE ATTEMPTED INVASIONS OF IRELAND BY THE FRENCH IN 1796-98.

By Rear-Admiral P. H. COLOMB.

II. *Attempts Subsequent to those of Hoche.*

WHEN I wrote the first of these notes, I had not been able to procure a copy of the "Life of Hoche," which was published in France soon after his death. I have since procured a copy. It is the 4th Edition, published in Paris in the year VIII of the Republic, or 1800 in the ordinary calendar, and it is dedicated by its author, Alexandre Rouselin, to "The Eternal Republic," the dedicator calling himself "one of its sons." The character of the book is well denoted by this introduction, especially when we remember that Napoleon had been then for some months First Consul and steadily engaged in knocking the Republic on the head.

This "Life of Hoche" throws no direct light on his attempted invasion of Ireland. It carefully avoids stating a single definite fact, and is but a rhapsodical glorification of the Commander, who, it represents, had a soul entirely above buttons.

But, indirectly, we can but believe that the author was perfectly aware that there was not a word to be said on behalf of the reasonableness of the attempt; and that everyone capable of forming a judgment was, from the first, sure it would fail.

The matter which is made clearest, by the clumsy endeavour to conceal it, is that Hoche was driven by a mad jealousy of Napoleon, and a burning desire to rival and overthrow him, and that this passion was at the bottom of the whole miserable proceeding.

Undoubtedly, however, it may be argued that, whatever were the causes of Hoche's failures in 1796-97, it was very near success, if the landing of 19,000 or 20,000 men on the shores of Bantry Bay without provisions could be so accounted. In my description, I have endeavoured to show that this nearness to such a success was chiefly due to something like extraordinary remissness on the part of the Commanders of the British Fleet, but that the ultimate failure was on the one side due to French disbelief in the possibility of such remissness; on another, to the direct action of a single British cruiser; and on the third side, to a realization of what was before them even if they did land.

I am well aware that my accounts are very incomplete, and that a great deal more research and comparison than I have yet found time for is necessary before the history of Hoche's expedition can be properly written. But the detailed story that we find in Wolfe Tone's diary does impress me with the conviction that the mere sight

of the barren shores of Bantry Bay, and a complete absence of all demonstration of welcome from the inhabitants, absolutely dashed the hopes of the invaders. Even Tone himself was partially awakened, and his desire to transfer the landing to Sligo Bay could only have arisen from a late understanding of the uselessness of landing at Bantry.

But does not this show that, in the opinion of the French at least, what we are accustomed to speak of as the near success of Hoche's expedition bore to them a totally different aspect? It was to them, not a near success, but the vicinity of a failure very much greater than that which they actually experienced. Those of them who did get back to France could only have been thankful that it was no worse; and subsequent experience could but have confirmed them in that feeling. They might have lost all their ships and all their men without effecting any appreciable damage to Great Britain. Their only hopes of doing the latter rested on their meeting a friendly people with all classes ripe for revolt, capable of discipline, ready with supplies of money and men. There was not in Ireland the slightest chance of any such things, and all that Hoche's flying column could have done would have been to inflict a certain amount of misery on itself and the locality it covered, and then to have laid down its arms. M. Thiers speaks of the terror of the English Government in relation to Hoche, but it is scarcely possible his attempt could ever have been regarded as more than an inconvenience.

The proof of all this seems to arise out of the successful landing of General Humbert at the head of 1,000 to 1,200 men on the 22nd of August, 1798, at Killala Bay.

The French had by no means been cured of their hallucination with regard to Ireland; and, undoubtedly, if things had been as they looked in that country, there was no better method to pursue than sending a succession of small landing parties which could more easily evade British cruisers, and would, wherever they landed, form a nucleus or rallying point for the disaffected populations to concentrate upon.

With some such view, but vaguely entertained, General Humbert sailed from Brest (James says Rochefort) on the 6th of August with 1,000 to 1,200 troops in the frigates "Concorde," 42, Captain Savary, "Franchise," and "Médée," 40, Captains Guillotin and Coudein. The ships arrived in Killala Bay on the 22nd under English colours. They were at once visited by some of the leading people of Killala, who were naturally made prisoners, and about 700 men landed and took possession of the town. They made their first military success in this town by the capture of one Officer and twenty men of the Prince of Wales's Fencible Regiment.

The Prime Minister, the Duke of Portland, reported this occurrence to the Lord Mayor of London on the 27th of August, and certainly no amount of reading between the lines of his dispatch would cause one to suppose that the Duke had as much as one extra pulsation in dictating it.

The French were so entirely in the dark in their views of Ireland, that Humbert landed without any military chest, expecting that war would support war. But this could not be, when the war was to be made by a little flying column with no communications, no chance of immediate reinforcements, and in the middle of a population which, unless it was paid for it, would only move in support of the established authority. The poverty-stricken rabble began to flow in on the French standards; but no money, no supplies, and no horses or cars. The Irish people in those parts were willing enough to take what was given to them by the invaders, but most of them had absolutely nothing to give, and those that had anything considered it most prudent to retain possession of it as long as they could.

On the 24th the French made a reconnaissance to Ballina, 6 or 7 miles to the southward, which was repulsed by a party of Carabineers and some Yeomanry, and these in their turn, advancing towards Killala, were driven back.

On the 26th Humbert, leaving 200 men and 6 Officers at Killala, advanced with some 900 men of his own, and some 2,700 of the impoverished and ignorant crowd of Irish which had joined him. He entered Ballina unopposed, but not a single person of respectability was there to give him welcome. There was a welcome, but it was offered by the dead body of an active Franco-Irish agent, hanged on a tree with a French commission in his pocket! It was well to make a Republican demonstration out of it, in giving the body an abundance of fraternal embraces; but the conveying it to the Roman Catholic Chapel and leaving it lying in state there required some little reconciliation and explanation, for General Kilmaine's proclamation had been scattered broadcast in those parts, in which it was said that one of the chief aims of the French was to "free" the Irish peasants "from the fetters of religion, and the frauds of priestcraft." "Religion," said the General, "is a bondage intolerable to free minds; we have banished it from our own country, and put down that grand impostor, the Pope, whose wealth we have sacrificed on the altar of reason!"

While the French had thus made their advance of a half-a-day's march in four days, several armies were concentrating from several quarters for their extermination. It is true that the greater part of these troops were half trained Militia and most of them Irish Militia, amongst whom were many half inclined to believe in the political millennium which the French preached.

The country in which Humbert found himself was not rich, and the roads available were few. Besides the detachment captured at Killala, there was a considerable body at Galway under Generals Hutchinson and Trench. There were also troops at Tuam, at Loughrea, at Gort, at Athenry, at Athlone, at Carrick, and at Sligo. The towns formed part of a circumference of which Killala was the centre, and it was only necessary to contract its dimensions by advancing, to hem Humbert completely in and prevent his escape in any direction. Unfortunately the generalship of the moment was not quite equal to this conception, or the enemy was unduly despised.

He was by no means to be despised. Humbert's troops were spare little kiln-dried and worn men, veterans from Italy and from the Rhine, full of fanatical republican fury, enured to hardship, incapable of ordinary fatigue or of ordinary fear. The Irish forces were partly disaffected, scarcely disciplined, unused to privation, and had scarcely seen a shot fired in anger.

The Lord Lieutenant in Dublin directed General Lake to take the command of the forces in Galway, Mayo, Sligo, and Roscommon. He sent orders to the Generals at Galway to collect their forces and march to Castlebar; he strengthened the garrison at Carrick by detaching the City of Limerick Militia thither from Athlone. He himself pushed on towards Athlone, by Philipstown and Tullamore, carrying with him the 100th Regiment, two battalions of light infantry, and the flank companies of the Bucks and Warwick Militia. Behind him, with the view of covering the capital, the Brigade of Guards were advanced to Mullingar and Kilbeggan.

Generals Hutchinson and Trench, in obedience to their orders, marched through Tuam with the Kerry Militia for Castlebar; at Tuam they picked up detachments of the Fraser Rifles, and, either at Castlebar or on the way thither, were joined by the Kilkenny Militia from Loughrea, the Longford Militia from Gort, detachments of Lord Roden's Fencibles, four 6-prs. and a howitzer from Athenry, and 100 men of the 6th Regiment from Galway. The troops were collected at Castlebar by the 24th of August, at which time General Hutchinson fell sick.

It was a clear mistake in generalship thus to strike out independently into what might have been held the enemy's country, when the Lord Lieutenant's forces were so far behind as to be incapable of offering support. For at this time he had not yet arrived at Philipstown. Concentrations at Tuam, at Athlone, and at Carrick, and simultaneous advances from these points, would have paralysed all the movements of Humbert, and have caused him to lay down his arms without striking a blow. As it was, the force thus advanced to Castlebar, though numerically much superior to the French alone, though not to the French and the Irish rabble which they had armed, were only Militia, and mostly Irish Militia. As the Lord Lieutenant had reached Kilbeggan on the 27th of August, delay in advancing beyond Tuam would seem to have been a reasonable proposal. But Humbert afterwards declared that he met no Generals in Ireland but Colonel Vereker, and he had certainly reason for holding the opinion. Hutchinson—Lake not having yet arrived at Castlebar—was about to commit another and most inexcusable error.

Castlebar is nearly due south from Killala, and rather over 20 miles distant as the crow flies. Midway between the two towns lies Lough Conn, a piece of water spreading N.N.W. and S.S.E., and extending 10 miles in those directions, with a breadth of about 3 miles. Ballina, now occupied by Humbert, lay about 5 miles east of the head of the lake. The shortest road, and the easiest, from Ballina to Castlebar ran east of Lough Conn, along the right bank of the River Moy, and crossed it by a bridge at the town of Foxford.

Then it turned to the south-west, and, rounding the south end of the lake, went on to Castlebar. The control of this road was therefore at Foxford, where the bridge was.

There was, however, another mountain road, longer and more difficult, which ran from Ballina nearly due west round the north end of the lake, and then nearly due south to Castlebar. Five miles or so to the north of Castlebar, this road ran through a defile called the Pass of Barnageeragh, which was the controlling position of the route, though not so absolutely as the bridge at Foxford was of the other one.

If one might venture to say so, there were too many Generals in and about Castlebar for the simple work that had to be done, General Hutchinson, in command, was ill on the 24th of August at Castlebar. There also was General French, while General Taylor was at Foxford with the Kerry Militia, and, no doubt, other troops. All three Generals appear to have entirely made up their minds that the enemy would advance by the route most convenient for his defeat. They were quite ready to stop him at the bridge of Foxford, but had not even a vedette to watch the western road. When it was quite certain that nothing was coming Foxford way, General Taylor absolutely declined to look round the south end of the lake, where he could operate on the flank of an enemy advancing by the western route.

In short, all preparations for meeting the enemy, should he come by the way which was worst for himself, were made, and no preparations whatever were made for meeting him if he came by the way which was best for himself.

Humbert, well versed in the ordinary strategy of war, gave out his intention of marching by the Foxford road. But having marched 2 miles on that road on the 26th of August, he suddenly turned sharp to the right along a cross road, rounded the northern end of the lake, and marched south for Castlebar.

General Hutchinson had reported on the 25th that he was "receiving every assistance from the people of the country"—these very people on whom the French relied—and it was to assistance of this kind that he was indebted for escape from a far greater disaster than that which actually befel him. A farmer, whose land was north of Castlebar, and in the immediate vicinity of the Pass of Barnageeragh, was out looking after his cattle at three o'clock on the morning of the 27th. Looking to the north he saw a strong body of men, dressed in blue, coming towards him. He instantly threw himself into the saddle and galloped to Castlebar to give the alarm. This warning gave the British time to form, which they did in two lines, along a range of rocky heights north of the town, and commanding the ground over which Humbert must advance. The British had two light field pieces on the right of the road, and other guns of the Kilkenny Militia on the left.

The enemy appeared at eight o'clock, and, advancing in column, made three attempts to penetrate the British lines, being each time forced to fall back by the fire of the artillery. The French then

deployed right and left in skirmishing order, making use of every scrap of cover. The Militia regiments began to show signs of unsteadiness. They opened fire long before it could be effective, and, probably shaken by its apparent want of result, grew more unsteady still.

The French, rightly interpreting the state of the case, pushed quickly on. The British infantry began to give way all along the line, and the guns were left unsupported. The artillery were just able to fire three more rounds, when the French rushed on and captured the guns. The whole army, except a few of the Longford Corps and some other stragglers who were rallied, and showed a little front to the enemy, fled pell-mell into Castlebar. Some Officers and others, with some men of the Royal Artillery, got a gun on the bridge, and held it for some time. But a charge of Humbert's horsemen—he seems to have had but few—having put nearly half this party *hors de combat*, the other half fell back.

The flight continued through and out of the town, pursued only by ten or a dozen French horsemen, which were easily checked and driven back by a larger number of "Lord Roden's foxhunters." But the flight went on, and the demoralized troops ran 30 miles to Tuam, and not content with that, some of the Carabineers got as far as Athlone on the afternoon of the 29th, having gone 63 miles in 27 hours.

Such a victory as this, in which the British lost 53 killed, 34 wounded, and 279 prisoners or missing, besides 14 guns, ought to have put heart into the French General, and drawn to his side all the disaffection there was in Mayo and Galway. But the total result seems to have been the desertion of a few of the flying army, and the conviction in the mind of the French General that the expedition was a fiasco.

He remained at Castlebar till the 4th of September, behaving with kindness and courtesy to the better classes, who would have nothing to do with him, and treating the unhappy rabble that dogged his footsteps and hampered him like so many slaves. "The French," said the describer of these events, "ate the best of meat and bread, drank wine, beer, and coffee, and slept on good beds. They compelled the rebels to eat potatoes, drink whisky, and sleep on straw. They beat and abused them like dogs, in the name of liberty, equality, and fraternity."

Lord Cornwallis, now within 30 miles of Castlebar, took in the situation completely. He said he had every reason to believe that the French intended to march north, hoping that a French force might get into some of the bays, "without succour from which, every point of direction for their march seemed equally desperate."

Though Humbert must have been very well aware that it was only prolonging the agony, yet he was unable to bear the thought of laying down his arms at once, and so, on the night of the 3rd of September, he sent off his baggage and cannon, with part of his troops, towards Sligo, 43 miles as the crow flies, north-east of Castlebar, and next morning he followed with the remainder of his troops. Castlebar was reoccupied by the Royalist troops the same evening. Even the

rabble which had attached itself to Humbert's army began now to see that the game was up and to desert him by scores.

Humbert passed Barleyhill and Swineford to Tubbercurry, being watched by detachments of Yeomanry, with which there was a skirmish. At Tubbercurry he was joined by a new body of the rabble, which had come from Ballina, not probably understanding the real state of the French position.

Lord Cornwallis had been at Athlone with the main body of his forces at this time. General Lake rallied the forces which had retired from Castlebar at Tuam. General Taylor had fallen back to Ballyhadireen, a place west of French Park. Colonel Crawford, with Hompesch's dragoons and Lord Roden's Fencibles, was the first to arrive at Castlebar after the French had evacuated it, and he at once followed up their rear.

While the French were marching along the main road crossing the Moy, at Ballilaghan, turning due north to Foxford, then to the east, crossing the Moy again at Swineford, and on to Ballaghy, and then turning N.N.E. through Tubbercurry to Colooney; and while Crawford was following along that road with his cavalry; Lake, with his reorganized troops, was marching N.W. to Hollymount, then E.N.E. to Ballialough, and then N.E. to French Park, by the only road available. His forces amounted to about 2,000 men.

At French Park there are cross roads, one leading east to Carrick, and the other west through Ballyhadireen, joining the road over which Humbert had passed, at Ballaghy. Lake took the western road, picked up Taylor's brigade as before related, and followed the road towards Sligo with the French in front of him.

Cornwallis had gone to Hollymount, but turned back to French Park, and then, with his troops, went on to Carrick. It will be seen, therefore, that while the French were following the only road towards Sligo, they were being pursued by the superior forces of Lake, while if they attempted to turn to the southward, through Leitrim into Longford—supposed to be a very disaffected county—Lord Cornwallis was ready to operate on their flank.

The small force of Yeomanry which had met Humbert at Tubbercurry sent word of the French advance to Colonel Vereker, who commanded at Sligo with a force of 300 men and a couple of light guns. This Officer at once marched out and took up a strong position at Colooney, 5 miles south of Sligo, and 13 north-east of Tubbercurry. His troops were skilfully placed, with his right on high ground and his left covered by a river. Humbert, marching on Sligo, found Vereker in his front, attacked him, and, after a sharp action, drove him across the stream.

But Humbert was checked. He lost 28 killed and 30 wounded, while Vereker's loss was but 31 placed *hors de combat*. The story is that while Vereker thought he had only to deal with the advanced guard of the French, Humbert, from the obstinacy of the defence, believed he had to count with a strong force behind it.

The check was sufficient to cause the French to abandon the idea of going to Sligo. Instead, they turned to the eastward and followed

the road leading to Dromahair and Manor Hamilton. This road, before reaching the latter place, is joined by another, which leads up from Ballintra, where a bridge crosses the Shannon at the south end of Lough Allen, passes along the west shore of the Lough, and through Drumkeeran near its north end. The road then from Colooney to Manor Hamilton and from Drumkeeran to the same place forms two sides of a triangle, which is completed by a third road joining the two from near Drumkeeran to near Ballintoger, between Colooney and Dromahair.

I suppose that, before Humbert reached Dromahair, he must have pretty well made up his mind that there was nothing more to be done. At any rate, at that place, where there is a bridge over a river, he relieved himself of the greater part of his artillery—the captures at Castlebar. He left three 6-prs. on the road, and throwing five other pieces over the bridge into the river, went on towards Manor Hamilton, but, instead of approaching it, he turned sharply into the road leading to Drumkeeran and Ballintra. I cannot ascertain where Crawford was at this time, but I believe he could not have been well up with his rear, and that he did what Lake afterwards did, namely, take the cross road to Drumkeeran, which enabled him to gain considerably on the enemy. It is supposed that Humbert, in changing his route so suddenly and allowing himself to be so caught up, was making a last and desperate effort to reach the town of Granard, in Longford, where there had already been a rising and might be another. If he had such an idea, he could not have been aware of Cornwallis' presence at Carrick.

With the pursuit thus hotter than ever upon him, Humbert crossed the Shannon at Ballintra, and made a vain endeavour to destroy the bridge behind him. As Crawford's cavalry attacked his rear on the 7th of September between Drumshambo and Ballynamore, it is most probable that this pressed pursuit prevented the destruction of the bridge. On this same 7th Lake had only got as far as Ballintogher.

As soon as Cornwallis, at Carrick, heard of Humbert's crossing the Shannon into Leitrim, he made direct for Granard, being thus on the right flank of the French marching through Cloyne en Ballinamuck. Lake was now following with great speed, sending infantry forward, mounted behind the cavalry. It was impossible for the French to go on. The pressure was too great, and they halted as if to face Lake at Ballinamuck. There was, however, no real attempt to fight an action. There was but a little skirmishing between the French and the light battalion and the Armagh Regiment, the advanced guard of Lake's troops and the only forces engaged, and then group by group the French laid down their arms.

Such was the end of Humbert's escapade, undertaken, as the performers themselves, with much cursing of their pseudo-allies, averred, in consequence of entire misapprehension of what was before them. The end came four days after quitting Castlebar, and seventeen after the landing had been effected in Killala Bay.

No doubt different men may look at this passage of modern military history in different ways. It may be at once admitted that Humbert's

fate, and that of Ireland, might have been entirely altered had there been a genuine spirit of revolt in the Irish people. But it can scarcely be said of any people numbering several millions that the difference between successful and unsuccessful revolt can be made up by the landing or non-landing of a thousand foreign troops. From this view probably few will dissent, and then it will follow that, if Humbert's landing was to stand alone, the expedition promised dead loss to France, and nothing more.

It was, however, intended to have been followed up. The three frigates which brought Humbert and his troops over found their way back, not indeed to Brest, but to the Gironde, three days before Humbert surrendered, namely, on the 5th of September. They were afterwards able to make their way to Rochelle, where, being joined by the corvette "*Vénus*," they embarked a second body of troops, probably about the same strength as the last, and sailed for Killala on the 12th of October. In a fortnight the ships arrived there, but, learning the fate of Humbert's troops, Savary decided not to try it again, and made sail for France. On the 28th of October they were chased by two British sail-of-the-line and a frigate, but the pursuit was not pressed, and by dint of separating, and throwing guns, anchors, and cables overboard, they all managed to escape into their own ports.

Looked at as a whole, we see the principle of these two expeditions was attack by successive landings, the succession being necessitated by the difficulties of evading British cruisers. It was a plausible method, but yet unsound both in theory and in practice, as it turned out.

For, if we admit that 1,000 foreign troops were neither here nor there in a country really prepared to revolt, or if what the country wanted was not men but the material of war, arms, ammunition, and uniforms, then Humbert's true policy would have been to entrench himself at Killala, trusting for support either to the surrounding country or to the supplies brought with him over sea, to accept, drill, and organize the recruits coming in from the country, and not to advance till at least the second supply of troops should arrive from France. Then, indeed, an advance might have been made with some hopes of success and permanence.

But it is clear that such a course was impossible to Humbert. The fact that he was stationary at Killala would have certainly brought cruisers there to blockade him, while the fact that they were there would have put an effectual stop to his being reinforced by sea. He would also have certainly been blockaded by land. The advance which he made was, therefore, the only thing open to him, although it was patent that he could only surrender in the end. However plausible, therefore, this landing of small bodies of troops could not be defended on strategic grounds.

Very rapid succession in landing detachments would, no doubt, strengthen the method, but at the expense of probably greater chances of being intercepted at sea than if the expedition had been combined and had sailed in one body like that of Hoche.

Arguments in favour of such an expedition as Humbert's may be raised on the ground of his success at Castlebar. But this, we see, was a perfectly valueless victory to him. It could not have promised value but upon the supposition that he was dealing with a people whom the presence of 1,000 foreign troops would cause to revolt—a supposition itself valueless, because such a people must be without any stability unless we allow them to have been overawed by soldiery. But a soldiery which could overawe a people in earnest about revolting would have held Castlebar, and so we come back on our old traces and are forced to pronounce against the possibilities of success in such cases as Humbert's.

In a very small way indeed this policy of detachments was carried out to failure at a point further north in Ireland, while Humbert was still counter-marching to avoid his inevitable destiny. The day after he left Castlebar, the day on which the frigates arrived in the Gironde, namely, the 5th of September, the French brig "*Anacréon*" sailed from Dunkirk with General Rey, the Irish rebel Napper Tandy, forty-five soldiery, and abundance of proclamations of a bloody and relentless sort. The brig reached Rutland Island, just inside the Isle of Arran, on Sunday the 16th of September, and three boatloads of men were landed. The descent, however, was perfectly amicable. The Postmaster, Mr. Foster, reported it in every-day language, and got on very well with Napper Tandy, who was an old acquaintance of his. The country people were so ill-disposed as to fly to the mountains instead of welcoming their deliverers, notwithstanding, as the Postmaster said, that the French "took every pains to convince the people that they were their best friends, and such stuff." Napper Tandy was astonished to hear that few people had joined Humbert, and was dejected at the fate of that expedition. It was pretty clear that nothing could be done. The French re-embarked and put to sea, General Rey leaving Mrs. Foster the richer by the present of a gold ring, which he gave her in remembrance of her hospitality. The "*Anacréon*" got safe home again.

We have now seen how the fear of being interrupted by sea, together with the doubt as to the support which a revolting population might afford, were sufficient to dispel the hopes of Hoche's expedition, which, but for these things, would have been entirely successful. We have, then, seen how very far a successful landing was, in Humbert's case, from a final success. And we have seen how useless—even ridiculous—the attempt to land a very small body of men may become, when there is no real temper of revolt to support it. We have now to see, from an examination of Commodore Bompert's disastrous failure, how tremendous were the risks which every one of these expeditions ran at sea.

Savary's first expedition had hardly sailed, when preparations were begun at Brest for a still more important one. Commodore Bompert hoisted his broad pendant in the "*Hoche*," 78, and took the command of a squadron consisting of three 44-gun frigates, five 36-gun frigates, and a schooner. The ships embarked some 3,000 troops, which it was intended to land in Lough Swilly, no doubt as a diversion

in support of Humbert, though rather late in the day. There were the usual delays in fitting out, so that this squadron did not sail till the 16th of September.

The British blockading fleet was, as usual in those days, quite out of the way. But the inshore squadron was more numerous, and possibly more alert than usual. At daybreak on the 17th the "Boadicea" and "Ethalion," 28-gun frigates, with the sloop "Sylph," were lying, nearly becalmed, off the extreme end of the Saints. Bompert, to escape notice, had passed through the Raz de Sein on the previous evening, but was now seen by this little observing squadron 15 miles to the E.S.E., steering, apparently, directly for it. Presently a little breeze from the N.E., upon which the French ships made sail to the S.S.W. The "Boadicea" thereupon stood away to the northward to report to Lord Bridport, leaving the "Ethalion" and "Sylph" to follow the enemy up. There was another cruiser in the neighbourhood, the 36-gun frigate "Amelia," and she, passing unnoticed through the French fleet, joined the "Ethalion" at 2 o'clock in the morning of the 18th. At first, on this morning, the French steered as if making for Lorient, but at eight o'clock, five of the frigates turned and gave chase to the British ships, without, however, persevering, for at 10.30 A.M. the whole French squadron hauled their wind on the port tack, standing to the S.W. as for Cape Finisterre. By the 19th they had run 60 miles in this direction; but it was nearly calm on the 20th, and they only ran 10 or 12 miles; yet the three watchers never let go their hold. Early on the morning of the 20th the British had another success, being joined by the 44-gun frigate "Anson," and the four steady hounds remained in full cry. On the 23rd the French had altered course to the W.N.W.; and Captain Countess, of the "Ethalion," having little doubt of Bompert's destination, sent off the "Sylph" to give the Officer commanding on the Irish station notice.

On the 26th the ships were 180 miles or so north of Cape Finisterre, when Bompert gave chase to the British, in the vain hope of shaking them off. But, as Captain Countess said, they "left off chase at noon, when we shortened sail, and followed them again." On the 29th they had got to a position some 170 miles W.N.W. of Cape Finisterre, when the French made one more determined effort to shake off their pursuers; but, finding it in vain, made sail to the W.N.W. In this chase the French lost several spars, and the "Anson" sprung her main topmast. The French were now running nearly due north, and, from the 1st of October, were making 110, 170, and 210 miles a day. On the 4th of October the British ships were about 180 miles west of Clew Bay, when, thick weather coming on, they had the misfortune to lose sight of the French.

Sir John Borlase Warren had, in the meantime, been lying in Cawsand Bay, with the line-of-battle ships "Canada," "Foudroyant," and "Robust," and the 44-gun frigate "Magnanime," under his command. On the 23rd of September he had news of Bompert's sailing, and proceeded to the South coast of Ireland. Here, or near there, he received orders (by the "Kangaroo") to proceed off Achill

Head—I believe in consequence of the news brought by the “Sylph”—and on the 10th of October he was joined there by the 36-gun frigates “Melampus” and “Doris,” which had sailed from Lough Swilly on receipt of the “Sylph’s” intelligence. Sir John Warren sent the “Doris” to cruise off Tory Island, and the “Melampus” to alarm the Irish coast. In consequence of the weather, the “Melampus” did not part company, and in the evening the “Amelia” joined.

Sir John Warren, being well up towards Tory Island, was now, therefore, made aware of the immediate vicinity of the French squadron, and, when the “Ethalion” joined him next morning, the 11th, he had three line-of-battle ships and five frigates ready to meet them. Bompert’s fate was, therefore, in almost any event, sealed.

On the 10th the French first saw the land, and, with the view of keeping clear of the frigates, which he knew could not be far from him, bore up towards Killala, and then, the wind being N.N.W. and blowing strong, hauled sharp up to the N.E. On the 11th, at day-break, seeing nothing, Bompert bore up for Tory Island. At noon, the leading frigate, the “Immortalité,” signalled the enemy in the S.E. quarter. The French, thus well to windward, at once braced sharp up, and made all possible sail. Warren, on his part, with his superior squadron, made signal for a general chase, having discovered the French at the same time they discovered him.

Pressure of sail began to tell on both squadrons. The “Anson” lost her mizen mast, main, and main topsail yards. But the “Hoche” carried away her main topmast, which, in falling, dragged down the fore and mizen topgallantmasts, and tore her mainsail badly. The topmast rigging had to be cut away, so there was no possibility of fitting a new mast even had the weather allowed of it, and, as a consequence, the British began to gain on the French. In the evening the “Résolue” signalled that she had sprung a bad leak. Bompert sent her a message to authorize her to run herself ashore on the coast, making signals that might tend to deceive Sir John Warren, and draw him after her. The “Résolue,” however, getting the better of the leak, did not take any steps, while Bompert, finding it hopeless to escape to windward, bore up in the vain hope of passing the British, and escaping to leeward.

This was the state of things discovered at daylight on the 12th of October—the British, in no order, beating up to the northward and to windward, the French, the wind having much moderated, formed in two successive loose lines abreast, running—as it turned out—right into the arms of their opponents. They were unable to avoid the inevitable, and hauled their wind into a rough line-of-battle on the starboard tack. In this position the British began to close on them to leeward.

It was not, however, possible to form the British till 7 A.M., when the “Robust” being ordered to lead, the rest of the ships following, as they came up, the fight took place off the Bloody Foreland. It began at twenty minutes past seven, and continued in some order with both fleets on the starboard tack until eleven. Then the “Hoche” struck, and the frigates dispersed, pursued, according to signal, by

the British ships. In half an hour the "Embuscade" surrendered also. Next followed the surrender of the "Coquille," then that of the "Bellone." "Thus," wrote Sir John Warren, in his dispatch, "by the vigilance, perserverance, and spirit of this little detached squadron, a line-of-battle ship and three large frigates were taken from the enemy; and his views upon Ireland entirely frustrated. This was effected with comparatively little loss, under very unpromising circumstances from the state of the weather." Next day some of the escaping frigates being pursued, the "Résolue" struck to the "Melampus." Still later, a fifth frigate, the "Loire," after escaping from the clutches of her inferior, the "Mermaid," fell into those of the "Anson" on the 18th of October, and was made a prize of. Still later, a sixth frigate, the "Immortalité," fell a victim on the 20th of October, to her equal, the "Fisgard."

It is scarcely possible to imagine failure more complete than that of Bompарт. The point to recollect is that what happened to him was normal, and to be expected, while the escape of the larger fleet of Hoche was altogether abnormal. That the frigates which saw and followed Bompарт up to such good purpose that Sir John Warren was ready to receive them off the Bloody Foreland, should do so was only what might have been expected. How it came to pass that Hoche's squadron should have been able to anchor in the Bays outside Brest, and deliberately to put to sea from thence without being followed up, is still a point for investigation. It may be assumed as quite certain that, if either Hawke or St. Vincent had been in command instead of Colpoys, Hoche, if he had dared to put to sea, would have been destroyed before he got 50 miles out of Brest. Bridport not only let Bompарт's squadron put to sea, but next year, by a sort of inexplicable fatuity, allowed the whole of the Brest Fleet to escape and go, he knew not whither.

But if we separate the personal from the material elements in these cases, it becomes plain that what secured Bompарт's defeat was the happy supply of a sufficient number of frigates, and what secured Hoche's escape was the paucity of these necessary adjuncts to any efficient blockading operations.

And I do not see that any of the lessons to be drawn from the four or five failures of the French in their invasions, and attempted invasions, of Ireland in 1796-97 and '98 ought now to be lost upon us. In all cases they were mad attempts, based on a misconception of the political state of Ireland. If we say that such misconceptions could again exist—which I disbelieve—and that such invasions may in the future be contemplated, then, I think, it is plain that our true reply is not a strengthening of the defence in Ireland, but the provision of such a cloud of small watchers as shall make intelligence over sea certain, and insure to any such expedition the reception which was given to the unfortunate Commodore Bompарт.

Friday, January 8, 1892.

LIEUTENANT-GENERAL SIR ROBERT BIDDULPH, G.C.M.G., C.B.,
R.A., Director-General of Military Education, in the Chair.

THE RUSSIAN LANGUAGE AND LITERATURE.

By EDWARD A. CAZALET, Esq.

PART I.

Précis.

I MUST first of all solicit indulgence for imperfect diction and inevitable omissions. Although an Englishman and a British subject, I was born and partly educated in Russia, and spoke Russian before knowing English.

Experience suggests that the popular notion which attributes special aptitude to the Slav race for acquiring languages is exaggerated. The fact is that the gymnastics of the tongue, if the expression may be used, which a child of any nationality undergoes when beginning with Russian, is sufficient to make other languages comparatively easy. Besides that, Russians, Poles, &c., give more attention than others to the study of modern languages, and therefore they know them better.

It is a truism, which bears repetition, that languages being merely a medium through which to acquire knowledge, it is all-important that they should be taught in early childhood, when they can be easily picked up, and not in later years when time is required for more important studies.

Between English and Russian, which at first appear to have nothing in common, there exists a remarkable inherent similarity or affinity in the construction of phrases. This may be proved by the simple fact that, if you translate word for word from English into Russian or *vice versâ*, your translation, with all its defects, will be comprehensible and sometimes even good, but, if you try the same experiment with any other two languages, the result, as a rule, will seldom be satisfactory. Besides that, an Englishman pronounces Russian better than a Frenchman or German.

Before the Crimean war English people were more popular in Russia than other foreigners, and why should not the revival of this good feeling be encouraged?

As a man of peace, my heartfelt wish is that there should not only be a cordial, but a growing good understanding between two great

empires and nations, and I have often thought that this might to some extent be promoted by a more widespread and intimate knowledge of the Russian language and literature in this country.

To study Russian merely in order to act as an interpreter is scarcely sufficient for the ambition of an intelligent student, and to keep up even that knowledge practice is required, as every thoughtful gentleman who has lived any time in Russia will confirm.

But how is this desirable practice to be obtained?

A Russian "Literary Society and Debating Club," founded in London, should become the common ground for the interchange of useful knowledge; and for the acquisition and improvement of written, and most especially *oral*, Russian, which is so difficult to acquire and to maintain without constant practice and intercourse.

May the following imperfect sketch excite a little interest as regards Russian books. A desire to read them in the original and to converse with Russians in their own tongue might, perhaps, be the next step in the right direction.

Russian, *i.e.*, Slavonian, in common with all Slav tongues, forms a part of the vast family of Indo-European languages. To this group belong the languages of the ancient Indians (Zend), Persians, Greeks, Romans, Germans, and Lithuanians. They all originally came from Central Asia, where they formed one people and spoke one tongue, whose characteristics have been preserved in the ancient written language of the Hindus—the Sanskrit.

All Slavs who in times long past migrated from Asia (Iran) to the shores of the Middle and Lower Danube were supposed to consist of one people and to speak the same language. Later on, in consequence of various circumstances and conditions, they became subdivided into various tribes and dialects. The learned Chek Shafarick counted twelve of these dialects, but later authorities reduced them to seven or eight.

At the present time, all Slav dialects are divided into two branches, the South-Eastern and the Western. Roughly speaking, the former, for the most part, adopted the religion and civilization of the Greek Orthodox Church, while the latter were under the influence of Rome.

The origin and formation of the Russian language appears logical. Slavonian was the basis; Greek words expressed what had reference to religion and Byzantine civilization; Scandinavian, Latin, and Polish had a passing influence; the Mongolian bondage gave Tatar words, dealing with matters of ordinary life, apparel, &c.; Peter the Great introduced many foreign words with the arts and sciences which he adopted from Western Europe; Germany supplied the vocabulary for civil and military administration; France furnished the parlance of polite society, while England and Holland gave naval and business terms.

"For flexibility of construction Russian is probably unsurpassed, and for poetry it is beauty itself, being hard and soft in the same proportion. It admits of all rhythmical measure, besides affording every imaginable facility for rhyme.

“A distinctive feature of this copious and flexible tongue is that the purely Russian race from the White Sea to the Black, from Poland to the farthest confines of Siberia, speak with an inborn grammatical correctness perfectly delightful to ears which care for such niceties.”

Russians of all classes are, as a rule, musical, and have a good ear, which may partly be the secret of correct enunciation.

Little or Malo Russian is, perhaps, the only really distinct dialect of importance. “Barbarous idioms are inconsiderable when contrasted with those met with in all countries of Europe.” No h’s are dropped, and there is no nasal intonation.

(A translation from Lermontoff’s “Angel,” by Mr. Pollen, of the Indian Civil Service, and the original Russian verses were here read.)

Russian literature begins with so-called “old time stories” or *bilini*, which were not written, but only sung by minstrels.

These legendary ballads describe military leaders and even saints of the Church under mythological aspects.

Next came tales or *skazki*, which were also oral, and have a sort of cadence, but they are mostly in unrhymed lines.

The origin of Russian spiritual life and thought is, however, bound up with Constantinople, the Greek Byzantium. It was with that place that for 1,000 years war was constantly waged, and it was from there came the first dawn of civilization and the Christian religion.

The first rulers of Russia were Scandinavian Vikings, *i.e.*, Norman adventurers, of a race called Varago-Rus, who must have invaded and conquered the country. They gave it the name of Rus, afterwards Russia. But, according to time-honoured tradition, these Norman princes were invited by the leading citizens of Novgorod in 862, the invitation being couched in the following words to Rurik and his two brothers: “Our land is large and fertile, but there is no order—come and govern us.”

Olga, the widow of one of Rurik’s descendants, accepted Christianity from the Greek Patriarch at Byzantium, in 957. Her son, Sviatoslav, rejected Christianity, but his son, Vladimir the Saint, married Anne, the sister of the Greek Emperors Basilus and Constantine, and introduced the Christian faith, by first baptizing his army near the present site of Sebastopol, and afterwards by forcing the inhabitants of Kiev and Novgorod to be christened wholesale in the rivers.

The first *written manuscript* is said to be a copy of the Gospels, written at Novgorod in 1056. It was copied from the original Slavonic translation, which the monks Saints Cyril and Methodius had made from the Greek Testament.

Sermons appeared, composed in imitation of the Greek Byzantine preachers, who had transmitted to Russia their florid style, through the medium of Bulgarian and Servian translations.

Polemics, and abuse of the Latins, estranged Russia from Western Europe.

To the 11th century is ascribed the Chronicle of Nestor and other narratives compiled by monks, which served as materials for history.

Vladimir Manomakh's (1113—1125) "Pouchenie" or "Book of Instruction," describes Slavonic life before the Mongols conquered Russia.

"Slovo o polku Egorové," a poem in prose, deprecates internal warfare among the numerous petty autocrats, and relates Egor's campaign against the Polvozi in 1185.

"Zadonstchina" is the victorious march of Dmitry Douskoi against the Tatars.

The temporary subversion of Russia by the Mongols or Tatars greatly retarded civilization.

Book learning is transferred from Kiev to Moscow about the 16th century.

The printing press is established at Moscow, in 1564, by Ivan the Terrible. His correspondence with Prince Kurbski is curious.

In 1581 the first complete version of the Bible in Slavonic appears.

"Domostroi," by the monk Sylvester, initiates us into the cruelty and tyranny of domestic life.

In the 17th century, Kubasov, Katoshikin, Krizhanich, and Simeon Polctzki were the most prominent writers.

Before Peter the Great, the Academy, later the University, of Kiev was the only centre of higher education. He introduced the vernacular instead of the Church language. The first newspaper, "The St. Petersburg Gazette," appeared in 1703.

Before Catherine II the most prominent authors were:—

Prince Kantemir, who translated Horace, and composed satires.

Lomonosov, a fisherman's son, advanced science, wrote odes, and formed the language, &c.

Tatischev tried to write a "Russian History from the most Ancient Times;" Trediakovski composed an epic, "Telemakhida."

Sumarokov, Kniajnin, and Heraskov (the first actor was Volkov, who founded a theatre) were prolific writers. Hemnitzer was the earliest fabulist.

In Catherine II's reign, Derjavin, the poet, and Von Vizin, a writer of comedies, were most prominent. Catherine, herself, composed dramas, operas, and satires, also criticisms on Free Masonry and Theosophy.

Karamzin wrote a history of Russia down to Michel Romanoff, the ancestor of the present dynasty. He wrote popular tales in an easy, flowing style.

Gnedich's translation of the "Iliad" is correct, but heavy.

Ozeroff's tragedies and Dmitrieff's fables are also worth mentioning.

Krilov is one of the greatest fabulists of any country. (Some translations of his fables, and Gogol's opinion of him, were read out.)

Zukovski was an elegant poet, who translated Schiller, Tom Moore, &c. He was the tutor of the late Czar Alexander II.

Alexander Pushkin (1799—1837) was the most national and greatest poet. "Eugene Onegin," "Captain's Daughter," "Boris

Godounov," &c., were his most prominent works. He was killed in a duel by a Frenchman.

Lermontov (1814—1841) was another heaven-born poet.

His "Demon," a poem, and "Hero of our Time," a novel descriptive of the Caucasus, are masterpieces. He was also killed in a duel when only 27 years of age.

Releev wrote poems of a political character. "Voinarovski," the nephew of Mazeppa and an exile in Siberia, is the hero of one of his poems.

Releev was one of the leaders in the revolution against Nicholas I in 1825.

Bilinsky was a critic of sagacity, who first understood the genius of Pushkin and Gogol.

Alexander Greboedov wrote "Gore ot ouma," *i.e.*, Grief from wit, a satirical comedy about Moscow aristocratic society. It is terse and "familiar as household words." He was murdered at Teheran, where he was Ambassador, in 1829.

Nicholas Gogol (1809—1852), was a most original author, who wrote "Dead Souls," a novel, and "Revizor," a comedy satirizing bribery and trickery of "chinovniks." "Taras Boulba" is a poetical novel of Cossack life. He is said to have contemplated writing a history of Little Russia, his native land, but it was not realized.

As the origin and the history of the Cossacks are not generally known, perhaps the following outline may be of interest.

Russian chronicles first mention the word *Kazak* in the reign of Vassily Temnoi (the Blind) in 1444.

In Turkish *Kazak* means a robber, but in Tatar merely an armed man. It was the name given to irregular troops employed on the frontier in the Ukraine, in Southern Russia, principally to watch the movements of the Tatars.

Besides these, another class of Cossacks was formed of Russian and other runaways, who wanted to lead a free-booters' life in the steppes.

They elected chiefs called Hetmans (Ataman), robbed the caravans and river barges of Poland and Russia, and attacked the Tatars and nomadic tribes.

In the 16th century they occupied the southern steppes of the Ukraine and were divided into two principal branches: the Cossacks of the Don and those of the Dnieper (or Malo-Russian).

The former consisted mostly of Russians, and the latter of Lithuanians and Poles.

The Kings of Poland saw the importance of utilizing these Cossacks as a barrier against the Tatars, and therefore endeavoured to divide them into disciplined regiments. The head Hetman was confirmed, if not nominated, by the King of Poland, but the latter did not practically exercise much real authority over the Cossack chief.

The so-called Zaporogian Cossacks (*za porogami*, *i.e.*, beyond the rapids or cataracts of the Dnieper) submitted to no foreign power, and were the nucleus—the heart and soul—of the real Cossacks.

Below Kiev the Dnieper runs through wild and desolate steppes. Its waters, pent up between high banks, rush over black rocks, forming cataracts or *porogi*. Lower down the river becomes wide, the current sluggish, the shores low and flat, numerous islands lie hidden by high rushes, offering a safe and secluded retreat, because, on account of shallow water, they can only be approached in very small boats or canoes.

Here was the nest and cradle of the Zaporogian Cossacks, and the spot where they hid their booty. They formed a kind of brotherhood and were guided by quaint and most original laws. The headquarters were situated on one of the islands and were called *Setch*, having the appearance of a fortified camp.

The *Vetch*, or *Radi*, was a sort of governing body in which the supreme power was vested. It elected the principal, or *Koshevoi Ataman*, who exercised unlimited power over the army in time of war.

They lived in wigwams, made of branches of trees, but had messes in common. Every new comer was accepted, provided he belonged to the Orthodox Church, and he was free to go or to remain as long as he pleased. Cossacks were supposed to be unmarried, and women were not allowed in the *setch*, under pain of death.

Sometimes these adventurers floated down the Dnieper in their boats, called *chaiki*, or sea-gulls, to the Black Sea, and looted Turkish villages.

The Sultan threatened the King of Poland with reprisals. Fortresses were, therefore, erected by the Poles near the cataracts, and endeavours were made to convert the Cossacks to Roman Catholicism. These measures led, however, to continued warfare, which ended in the apparent pacification of the Cossacks, but in reality sowed the seeds of the fierce struggle between the Russian Orthodox and Roman Catholic Churches in South-Eastern Russia, which undermined Poland, and finally led to its downfall.

In the 17th century, there was a whole network of the Cossack system, not only in the Ukraine, but extending all over Southern Russia and embracing the lands about the Rivers Don, Iaik, Oural, and even Siberia.

Their depredations could not be checked, and were only partially diminished by the formation of two parties in the Cossack population of the Don: those who had houses, and those who had nothing. The former wanted peace and quiet, but the latter, whose ranks were daily increasing by fugitives and deserters from all parts of Russia, thirsted for robbery and war against the Government.

Their desire to have an able leader was realized in the person of one Stepan (or Stenka) Razin, a common Cossack of great energy and daring. He conquered several towns on the Volga, pushed on to the Caspian Sea, penetrated into Persia, whence he returned laden with loot and prisoners.

Many Zaporogians joined the men of the Don, seized ships on the Volga, took the town of Saratoff, and were joined by the country population, as Razin pretended that the Czarevich Alexis (who was

already dead) and the Patriarch Nikon (who had been deposed) were with him, that he would maintain the Old Church books, and rob the rich to assist the poor.

The rebellion spread far and wide. Ultimately, Razin was defeated by Prince Bariatinsky's regular army. Razin ran away to the Don, but was handed over to the Government by the Hetman Jakovleff. Astrakhan was the last resort held by the rebels.

A short time before these events, the Zaporogian and other Cossacks, under the command of their Ataman Bogdan Hmelnitzki, also a common Cossack, who had sworn enmity to the Polish nobility, led by Prince Vishnevetzki, raised fire and brand, and, aided by the Tatar Khan of the Crimea, defeated the Polish armies in several engagements. But, on meeting with reverses, Hmelnitzki addressed himself to Russia for assistance, which finally resulted in Little Russia and the Cossacks being incorporated with Russia and turned into a barrier against Poland.

In Peter the Great's time the Hetman Mazeppa revolted and joined Charles XII, but was defeated at Pultava.

In Catherine II's reign another Cossack, who could neither read nor write, by name Emelian Pougacheff, on the Aik, near the Oural, gave himself out to be Peter III, whose death was disbelieved in remote regions of the Empire. Preaching war against the Empress and the nobility, who, he said, prevented his doing good to poor people, and promising assistance to the labouring classes, this daring robber raised an immense rebellion, conquered many towns, and, after having defeated several Generals, was at last taken prisoner and brought in an iron cage, like a wild beast, to Moscow, where he was hung, drawn, and quartered. This mutiny is well described by Pushkin in "The Captain's Daughter," and in his notes on the history of Pugacheff's revolt.

The Zaporogian Cossacks were dispersed, but many others near the Black Sea, in the Caucasus, &c., were formed, more on the basis of ordinary troops.

A certain amount of self-government was left to the Cossacks of the Don, the Heir Apparent to the Russian throne bearing the title of their honorary Hetman; but of late years, the land of the Don, like other portions of the Empire, is reduced to the same denominator as the other governments of Russia. So much for the Cossacks.

In by-gone days, songs about Cossack heroes formed a rough literature of its own in the Malo-Russian language, or rather dialect.

Friday, January 15, 1892.

LIEUTENANT-GENERAL SIR ROBERT BIDDULPH, K.C.M.G.,
in the Chair.

PART II.

Précis.

THE deep mourning which at this moment afflicts this whole loyal nation forcibly recalls to our mind the close blood relationship which unites the two August Reigning Families whose dominions extend over the length and breadth of the habitable globe.

To develop a good understanding between the peoples who inhabit these vast territories is one of the objects of the present lectures.

Before giving a sketch of modern Russian literature, perhaps it may not be un instructive briefly to relate, as a set-off to the picture, the history of Tartar bondage in Russia.

The Mongolian yoke did not crush national life, but it greatly retarded natural development, and it is a wonder how the Russians, after emerging from this thralldom, made up for lost time, and with what gigantic strides the reform, or more correctly expressed, the social revolution, brought about by Peter the Great impelled them along the path of European civilization.

In early history the weakness of Russia consisted in the so-called *appanage system* (i.e., the reverse of primogeniture), which led to the division of the country among numerous petty princes, who waged war with each other, and thereby became a prey to foreign invaders, especially to the Tartars.

In 1224 there first appeared on the southern steppes or plains of Russia, hordes of Mongols, consisting of nomadic tribes, which had been joined together under one great leader—Tchingis Khan.

After conquering the inhabitants in the Caucasian Mountains, he defeated the combined petty princes of Russia on the River Kalka, which falls into the Sea of Azoff.

These Tartar conquerors returned into Asia.

On the death of Tchingis Khan, his nephew, Baaty, reappeared with a crowd of Mongols, who this time brought with them their families, tents, and flocks. Advancing slowly, they were preceded by armed horsemen, who destroyed everything and made prisoners of the inhabitants. The ancient chronicles relate that, when the Tartars approached Kiev, the citizens of that town could not hear each other's voices on account of the noise of endless carts, the cries of camels, and the neighing of horses.

In one single day the whole of Kiev was destroyed.

The Tartars founded their capital, Sarai, near the mouth of the Volga. Their kingdom was called the *Golden* or *Kipchak* Horde.

The Russian princes were forced to bow down (*bit chelom*) before Baaty and to pay him tribute.

They were also bound to collect armies and to place them at his command, in case of need.

(The *knout* is considered of Tartar origin. Some persons maintain it is merely a corruption of *knot*, perhaps of Scandinavian or English origin. It was abolished by Alexander I. In Russian, *knout* is merely the usual word for whip in common parlance.)

The Tartars did not, however, interfere with the internal politics of Russia, and even exempted the Orthodox Christian clergy from paying taxes, which had been imposed on other classes.

The Chronicles of the Monks were the only literary works of this gloomy period.

The Tartars were idolaters, but they adopted Islam about 1272.

As the Grand Dukes of Moscow became more powerful they were charged by the Khans to collect tribute from the princes and to hand it to the Tartars.

The latter became weakened by internal dissension, and their Khan Mamai was defeated by Dmitri-Douskoi, the Grand Duke of Moscow, in 1378, on the Kulikovo Pole, *i.e.*, Snipe Field, near the River Don.

In 1408 the Mongols marched on Moscow, and obtained a heavy ransom, but they lost the power of enforcing the former regular payment of tribute.

In the reign of the Czar Ivan III, in 1480, the declining power of the (Sarai) Tartars, after over $2\frac{1}{2}$ centuries of existence in Russia, was destroyed with the assistance of the rival Khan of the Crimea, Mengli-Girei.

The last Khan of Sarai, Shig Achmet, died an exile and a prisoner at Kovno, in Lithuania, in 1502.

In 1521 the Tartars of Kazan and of the Crimea became allies and attacked Moscow, causing immense injury and carrying away hundreds of thousands of Russian prisoners.

(It was the same year that Martin Luther fought the Pope at the Diet of Worms. This shows the relative development of Germany and Russia in 1521.)

Russian proverbs, which are, perhaps, more numerous, telling, and picturesque than those of most other countries, sum up the matter as follows:—

“An unbidden guest is worse than a Tartar,” and “Tartar happiness is now a thing of the past, only known in old time stories.” Such is the popular historical retrospect, which takes in the whole past situation.

With the exception of some families of Mongolian descent which had become allied with the Boyars and other classes of society. Tartars of the present day are “hewers of wood and drawers of water.” The descendants of ancient Khans are now coachmen, waiters, and hawkers, who hail mostly from the Government of Kazan.

Although both were Mahomedans, the Tartars, unlike the Moors whom Ferdinand and Isabella expelled from Spain also at the end of the 15th century, possessed no skill in arts and sciences, and left no traces of culture behind them.

Silk *khalats* or dressing gowns, Kazan soap, and trade in horse-flesh are the *summum bonum* of their mental activity.

Another analogy exists between Russia of to-day and Spain four centuries ago—it is the expulsion of the Jews.

Trusting that this preliminary historical digression has not been distasteful to the audience, we will proceed with the literary portion of the lecture.

In order to understand the meaning of modern Russian literature, it is desirable to bear in mind that it has two distinct currents, which run in contrary directions, *i.e.*, the partizans of Western civilization, so called *zapadniki*, who admit that the civilization of England, France, Germany, &c., is suitable to improve Russian life; and, on the other hand, the Slavophiles and Panslavists, who imagine that Russia has a peculiar, inherent civilization of her own, which is far superior to the “rotten West,” as they are pleased to call Europe.

These patriots think that Holy Russia contains within herself all the seeds of this exclusively Slavonic civilization, which only requires to be brought out in order to renovate the whole world, and especially to educate and develop the far East, which is destined by Divine Providence, in their opinion, to be the chosen region of her activity.

In Russian literature realism predominates, but occasionally the genius of the writing is at the same time serious, religious, and pathetic.

On broad lines, two schools of Russian literature may be considered to exist:—

I. Pushkin and his imitators, whose problems are those of pure art, and whose ideals are placed above the temporary anxieties and interests of the present generation; and

II. Gogol and his followers, whose tendency is to reproduce in literature the daily questions of contemporary life, with all their hopes and fears.

Such, it is believed, was the idea already anticipated by Bilinsky, the prince of Russian critics, and developed by Milukov, one of the best of living critics.

Although the reign of Nicholas I, when Pushkin and Gogol flourished, was very stringent as regards the censorship, nevertheless the most artistic authors belong to his time.

His successor, Alexander II, whom somebody styled the most liberal man of his Empire, slackened the restraint of the censor's office, in consequence of which numerous new writers sprang up, treating questions of contemporary life, both as poets and novelists.

The great measures inaugurated by this Czar suggested new subjects for modern literature, which will show to posterity, as in a mirror, the historical pictures of Russian life, comprising the abolition of serfdom, the introduction of open law courts, local self-government of the communes or *zemstva*, the Crimean war, which did much to develop and educate the nation, the continued extension of the frontiers of the vast Empire, and the independence of Servia and Bulgaria, the co-religionaries of Russia.

This modern literature consists of poets and novelists.

Poets not unfrequently exercise a practical influence in forming opinions, firing the imagination, and exciting the passions, especially of young and ambitious nations. Even in an old country like France, the songs of Béranger probably acted more on the sentiments and actions of the masses than even the incisive philosophy of Voltaire and of Rousseau at an earlier date. We have, therefore, selected three modern Russian poets to serve as leading types of national thought.

Maikov, the artist, knew "the godly secret of harmonious verse," and had classical tastes, which he shows in his "Sketches of Rome," "The two Worlds," and other beautiful poems. He bitterly reproaches those who misunderstood the idea of the mighty reformer Peter the Great, and who glide along wearily, "like shadows, without strength, passion, or aspirations."

Homiakov is the bard of Panslavism, who preaches the fraternity of Slavonian tribes under the supreme leadership of Russia. He adjures Holy Russia to perform the high deed, as it is her destiny to accomplish the glory of the Slavonian world for the good of humanity. "The Eagle," "Kiev," "Be not proud before Belgrad" are lyrical poems. "The Vision" and "On reading the Psalms" are fine specimens of imagery and of diction. He imagines that Western Europe is on the wane, and that its power, glory, art, and science are passing away, never to return. He predicts destruction to "perfidious Albion."

As contrast to Homiakov's views, mention might be made of Tschadaer's theory, in the first half of this century, that Roman Catholicism would be a panacea for Russia. This idea was latterly more fully developed by Soloviev, a modern philosopher. The notion is that Roman Catholicism would bring Russia more in concert with Western civilization, &c. The truth is, however, that everything Roman Catholic and Polish (which are synonymous to the Russian mind) has always been distasteful to the bulk of the people, and, therefore, this theory is unpractical.

Nekrassov's songs are sad, gloomy, sarcastic, ironical; and, in pointing out the social ills of the times, he invites reflection on the question: "What is the reason that, for so many centuries, man has been poor, unhappy, and weak?"

One of the leading themes of his national poetry was the abolition of serfdom. This measure did not, however, materially improve the position of the serfs, because the traces of long oppression and exhaustive labour still stamped the barbarous habits of the people, and were evident in their ignorance, family despotism, poverty, and drunkenness.

"On the Road," "The Gardener," "The Forgotten Village," "The Pedlars," and "Frost the Red Nose" are all poems which sympathize with the miserable sufferer, born to struggle and to work. With all his literary faults, Nekrassov was a thorough exponent of the spirit and of the ideas of contemporary Russian society.

His numerous small pieces of poetry unfold the artificial and vicious side of various strata of society; the degraded position of

people labouring under the yoke of poverty and ignorance, the sufferings of the humiliated and the oppressed, and the despotism of wealth and power.

We now come to modern novelists, among whom Tourgeniev, Leo Tolstoi, and Dostoevski are familiar to the British public; while others, not less remarkable for genius and originality, are unknown, because not translated and, even, not translatable.

Tourgeniev and his brother were men of liberal views. Anticipating the liberation of the serfs, he described their inner life in "The Notes of a Sportsman." "Rudin," "The Noble Nest," and "Fathers and Children" show partly the action of the Russian gentry in connection with the serf question. "Thoughts were always pictures in his mind's eye."

His last novels, "Smoke" and "Virgin Soil," were supposed to be less in touch with Russian life, on account of Tourgeniev's long residence abroad.

Count Leo Tolstoi's tales are remarkable for unvarnished truth and absence of affected idealism. "Infancy," "Childhood," and "Youth," and "Sketches of Sebastopol," show his noble heart and love of truth.

"War and Peace" is a colossal picture of Napoleon's war on Russia in 1812. When the author describes or paints he is charming; but, as a thinker and philosopher, his heart preponderates over his head.

In "Anna Karenina" his strictures on modern Russian society are, however, most wise and pregnant with thoughts about its future uncertain destiny.

His religious theory, founded on the text "Resist not evil," is both ingenious and edifying, rather than applicable to real life.

Dostoevski.—Deep sympathy with suffering humanity, and a benevolent indulgence for the darkest vices and the most degrading weaknesses of mankind, with a philosophical insight into the secret springs which created these victims of society, have endeared the author to the Russian people. "Poor People" is an example of this style of writing. "Notes from the Dead-house" describe Dostoevski's life in Siberia, in connection with prisoners there—from a psychological point of view. "Crime and Punishment" is the story of a murder, written on the lines of Bulwer's "Eugene Aram;" but there is reason to think that Dostoevski never read the latter novel.

The outward colouring of Dostoevski's personages is often artificial, but their inner, moral life is true to nature. There is searching knowledge of the human heart, but his practical philosophy and views regarding social progress are erroneous.

There is a certain mystical socialism underlying some of his latest novels, which show the ghastly hideousness of some sections of Russian life.

Count A. Tolstoi, the cousin of Leo Tolstoi, was a man of such prominent talent that his reputation is scarcely overshadowed by his famous namesake. He was a Slavophil, not in a political, but in a literary, sense, because the sources of his inspiration were national songs, legends, traditions, and monastic chronicles.

A trilogy of dramas: "The Death of Ivan the Terrible," "The Czar Theodor Ivannovich," and "Czar Boris," are works of high merit.

"Kniaz Serebrenoi," or "The Silver Prince," is an historical novel of the time of Ivan the Terrible, whose ghastly reign was the author's favourite subject.

The conquest of Siberia is referred to in this novel.

Melnikov, known under the pseudonym of Pechersky, studied the life of the so-called "Old Believers," who would not accept the corrected version of the Church books, as inaugurated by the Patriarch Nikon, in the reign of the Czar Alexis, the father of Peter the Great.

In Melnikov's writings are visible, so to speak, the very roots from which has sprung national Russian life in all its off-shoots and branches.

His two novels are entitled, "In the Forests," and "On the Hills," being the two banks of the Volga, describing the life of the "Old Believers," and their manner of worship.

Vsevolod Krestovski wrote "The Slums of St. Petersburg," a novel of low life; "The Sanguinary Bubble," of which the Polish insurrection of 1862 is the under-current; and "Egyptian Darkness," with its sequel, "Tamara Ben David," evidently with the object of exciting national antipathy against the Jews, which culminated in their expulsion.

He also wrote a picturesque journey to Samarcand.

Goncharov, who sailed round the world, visiting China and Japan as the Secretary of the Russian Ambassador, Admiral Count Poutiatine, has graphically described this voyage in his diary, "The Frigate Pallas."

His three novels are masterpieces of art and philosophical study of human nature and Russian character.

In "An Ordinary History" are the two types of the practical man and the idealist, which as truly exemplify the dual current of life as the undying characters of Cervantes.

"Oblomov" is a more striking book, in which is displayed the true national Russian character, combining talent with indolence. It unfolds the vices of education, the disorder of every-day existence, and the apathy, which has become a second nature, in consequence of self-indulgence and weakness of character. As a set-off to the Russian Oblomov is the German Stolz, who, with lower moral and intellectual capacity, and with a narrow and sordid spirit, but aided by order, energy, and industry, becomes a useful and a successful man.

"The Landslip" (*Obriv*) suggests the problem how far the old and the new life in Russia can be considered good or evil. "New questions," "new men," "new ideas and principles," are philosophically contrasted with old traditions and notions, and all is expressed in beautiful language, showing high literary art.

Only three modern poets and seven novelists have been mentioned as time would fail us to speak of the others, viz.:—

Poets:—Mey, Polonsky, Tutcheff, Fet, Ogarev, Cherbina, and the Slavophil brothers I. and A. Aksakov, &c.

Novelists:—Grigorovich, Pissemiski, Madame Hvochinskaia, Saltikov (Schedrin), Leskov (Stebnitzki), G. P. Danilevski, Count Salias, Markevich, Rechetnikoff, Slepzov, Gleb Ouspensky, &c., and especially of the national dramatist Ostrovski, who has so cleverly exposed the weaknesses of merchant life in Russia.

Among the authors whose writings have been analysed, Count Leo Tolstoi and the poet Maikov are the only two still in the land of the living.

The generation which succeeds them is less remarkable in every respect, and, although the material horizon of Russia is becoming more extensive, the quality of authorship is on the decline. As a lover of Russian lore, I say it with regret.

Of late years there is a sterility in Russian literature. Let us hope it is only of temporary duration.

The newest works are of a strangely morbid character, as, for instance, "The Diary of Marie Bashkirzev," of which the exponents are not wanting, however, and include Mr. Gladstone in their roll.

"At Home and at War," by Verechagin (the brother of the painter, who also wrote sketches and reminiscences of interest, but without literary pretensions), and tales by Garshin, both about the Russo-Turkish War of 1877, considered partly from a psychological point of view, are not without talent; there is, however, something petty and puerile in many of the details.

To conclude: Although the Royal United Service Institution would seem to be devoted to the science of war, we civilians rejoice to see that it is a peaceful institution. It is the temple of Janus, but the doors are always thrown open, and the Committee wisely and generously encourage the study of peaceful arts, for the benefit of the whole nation.

In returning thanks for your indulgent attention, we beg to remind the distinguished audience that the main discussion, commenced last Friday, and now before us, is, "How best to form a Russian Literary and Debating Club" in this great metropolis, which should tend to mutually agreeable intercourse, to increased facilities in travelling in both countries, and to improve and advance, on a broad and comprehensive basis, the scientific, social, and also commercial and industrial relations between the people of England and Russia.

DISCUSSION.

1st Day.

The CHAIRMAN: We have some gentlemen present who have made a study of Russian, and we shall be very glad to hear anything they may have to say which will help to elucidate the subject before us. As regards the subject to which Mr. Cazalet alluded, viz., the formation of a Society in which the Russian language could be discussed and spoken, those who have passed in Russian I am sure will be glad to have opportunities of keeping up their conversation, which otherwise they may not always be able to do in this country.

Colonel JOHN DAVIS, F.S.A., 3rd Batt. R.W. Sur. Regt.: I think the suggestion

of a Russian Literary Society is an excellent one, and I trust the hint thrown out by Mr. Cazalet will bear fruit in the formation of such a Society. I have myself been a good deal in Russia, and many of the remarks made by the author about the character of the country and its literature have interested me very much. Russian ought to be a very useful language to England, not only for its political aspects, but also because of its great beauty. I have been very greatly struck during my visits to Russia with the liquid character of the language, and with its immense facilities for the expression of beautiful thoughts. I know very little of Russian myself, for, though I have tried to make it a study, time has not allowed me to do so to the extent I would wish; but, from my little acquaintance with it, I have been struck with its powerful means of expression, particularly its poetical expression. I hope very much that this Literary Society will be formed, and I would venture to suggest that this Institution—if room could be found—would be the most suitable for its location.

The CHAIRMAN: I could not help being struck with what the lecturer said as to the similarity of construction of the Russian and English languages. That being the case, it would seem to offer greater facilities to Englishmen than to other nations, because, as we all know, the great difficulty of dealing with foreign languages is very often the different order of words and grammatical construction, which prevents the student from expressing himself grammatically and accurately in the foreign tongue however well he may learn to translate books. The War Office has for many years past been offering inducements to Officers to study Russian, and their offers have been responded to, on the whole, I may say extremely well, for it seems to have been the most favoured language of those for which special inducements are offered, and, owing largely to the liberality of the Indian Government in giving Officers special leave to travel in Russia to perfect themselves in the language, a great many Officers, both in the Indian and British Army, have qualified themselves as interpreters. I am afraid the fact of this lecture was not sufficiently well known, or we might have had more present of those who have qualified as interpreters. I am sure it is a very important thing for them that they should have opportunities of keeping up their knowledge of the language. We all know from our own experience that languages we learnt when we were young, many years ago, do not remain with us always in the same facility unless we have opportunities of continuing to speak them, and I think it is most important, in view of the requirements of the public service, that those who have qualified as interpreters in Russian, and even those who are studying the language, should have opportunities of conversing in it. I do not know that we are able at this moment, at such short notice, to propose anything definite, but I hope something may be arranged to afford such opportunities for speaking Russian as have been alluded to. It seems to me, on taking a general survey of what has been said, one looks back on a country that is looming in the darkness, and what Mr. Cazalet has told us seems to carry us an immense way off to something very far separated from Western ideas. I think, having got, as he has, to the middle of the present century, and as his next lecture proposes to bring us down to the present time, we shall see what enormous strides Russia has made in that time, and how rapidly she has progressed from apparently an Asiatic and semi-civilized Power into one of the Great Powers of Europe, exercising a very powerful influence on the destinies of Europe. I do not know that I need do more than ask you to agree with me in thanking Mr. Cazalet for his lecture.

Mr. A. KINLOCH: Sir Robert Biddulph, you will, perhaps, excuse my rising as not quite an outsider, though not a member of this Institution—to offer a few remarks upon the suggestion that has been made. First of all, I beg to support heartily your proposal of thanks to Mr. Cazalet for the able manner in which he delivered his lecture. I have studied Russian literature a great deal—like Mr. Cazalet, I was born in the country, and almost spoke the language before I did my own—I have followed him very closely, and, I must say, he has dealt with his subject, which is a very wide one, in a very concise and yet explicit manner, and has given us the most interesting and most important events and topics in the history of Russian literature. The suggestion as to some means of keeping up the interest of the study of the language I also endorse heartily. The difficulty to my mind of carrying out the suggestion is, that there are so few Russian-speaking

residents in London who could be got together at the present moment to form anything like an association or a club. Perhaps, if more encouragement were given by the Government to study the language, particularly to Officers of the British forces, we might see more students in London, and probably more successful candidates at the biennial War Office examinations. To provide an adequate supply of members to an institution for the encouragement of the study of the Russian language, I would venture to suggest that there should also be some kind of inducement offered to candidates who have qualified as interpreters, to keep up their capabilities as efficient interpreters. From my experience as a tutor of the language, I find that the greater proportion of candidates who have qualified for interpreters soon lose all interest in the language after they have done with the examinations, because they have, as they think, no further immediate use for what they have acquired. I would venture to propose that a Committee be formed of members of this Institution, and such other persons as Mr. Cazalet might suggest, to consider the question of establishing a Russian Literary Society, and formulate some scheme by which it could be carried out.

The CHAIRMAN: As the discussion, in a way, has been reopened, I have only to repeat that it is most advisable and desirable, as I have already said, for interpreters to keep up their knowledge. As regards inducements from the Government, of course I am not in a position to speak on that subject, but I would only remind you that Government have offered what was considered a liberal inducement to Officers to make themselves acquainted with the language. The inducement to keep it up afterwards ought to be that, if their services are required, they should not show themselves as having merely undertaken it for the sake of the pecuniary reward, and have then forgotten it altogether. Therefore, I think, they have this inducement to keep it up, that they should not be found incompetent when their services are required. Although I am quite prepared to hear any suggestion from anybody else, I fail to see exactly what encouragement the Government could offer for Officers to continue to keep themselves thoroughly conversant with the language. I do not think the Government can do more than they have done, except as to giving permission to Officers to travel in Russia. The Indian Government have given that permission, and it has been extremely successful in its results. No doubt Officers spending six or eight months in Russia cannot fail to acquire a practical knowledge of the language, which those learning it in our own country can hardly expect to attain.









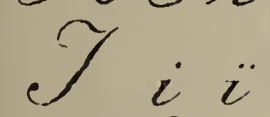
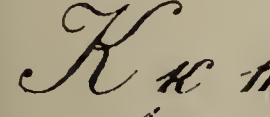
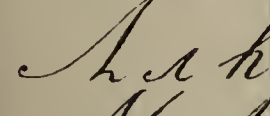



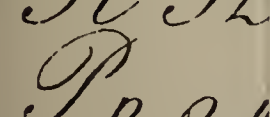

2nd Day.

The CHAIRMAN: We have had the advantage now of hearing the continuation of Mr. Cazalet's lecture, which he began last week. I hope we shall find some amongst the audience, especially those who have some knowledge of the Russian language, who will be able to join in the discussion, and ask such questions of the lecturer as they may desire fresh information upon, and also give us the benefit of their knowledge of the subject.

Lieutenant-Colonel J. C. DALTON, R.A.: I think we must all feel exceedingly indebted to the lecturer for the delightful *résumé* he has given us of Russian literature. I am afraid that what I have to draw attention to is very common-place after what we have heard. For those who have to translate Russian, both for written translations as well as for maps, it is absolutely necessary to have some system of transliteration for the Russian words. Recently the Royal Geographical Society has revised its rules for the spelling of place-names in all foreign countries; and attention has been freely drawn to them in the Press within the last month or so. Therefore, it occurred to us in the Intelligence Division of the War Office that it was desirable to bring the transliteration rules for Russian as far as possible into harmony with the Geographical Society's rules, so that when a map is made and names translated from a Russian map, the spelling should be, as far as possible, in accordance with these rules, and that there should be some one uniform system adopted. If I may be permitted, I will lay on the table a few copies of the rules, which we have recently revised, and I hope that any gentlemen here who

CHARACTERS

S.

Written Characters	Printed Characters	Cursive Characters	Equivalents	Remarks
	А а	Т т	т	
	В в	У у	у	oo, in boot
	Ф ф	Х х	х	
	Т т	Ц ц	ц	ts
	Е е	Ч ч	ч	ch
	Н н	Ш ш	ш	sh
	З з	Щ щ	щ	shch, in Parish church
	К к	Ъ ъ	ъ	mute Omit in transliteration
	И и	Ы ы	ы	{ ui i in middle of a word at end . . .
	Р р	Ь ь	ь	mute Omit in transliteration
	Л л	Ѣ ѣ	ѣ	ye yea
	М м	Э э	э	e a, in late
	Н н	Ю ю	ю	yu you
	О о	Я я	я	ya
	П п	Ѳ ѳ	ѳ	f
	Р р	Ѵ ѵ	ѵ	i Seldom used

blu & ū (adjective) should be transliterated ii
pronounced as ie in Hygiene

A TABLE OF THE RUSSIAN CHARACTERS

WITH THEIR ENGLISH EQUIVALENTS.

Written Characters	Printed Characters	Cursive Characters	Equivalents	Remarks	Written Characters	Printed Characters	Cursive Characters	Equivalents	Remarks
А а	А а	А а	а	а, in father	Т т	Т т	Т т	т	
Б б	Б б	Б б	б		У у	У у	У у	у	oo, in boot
В в	В в	В в	в		Ф ф	Ф ф	Ф ф	ф	
Г г	Г г	Г г	г (h)	г, always hard h, as in English	Х х	Х х	Х х	х	ch in Loch
Д д	Д д	Д д	д		Ц ц	Ц ц	Ц ц	ц	ts
Е е	Е е	Е е	е	е, in step, (ye, when initial)	Ч ч	Ч ч	Ч ч	ч	ch
Ж ж	Ж ж	Ж ж	ж	ж, in azure	Ш ш	Ш ш	Ш ш	ш	sh
З з	З з	З з	з	з, in Zenith	Щ щ	Щ щ	Щ щ	щ	schsch in Parishchurch
И и	И и	И и	и	ee, in meet	Ъ ъ	Ъ ъ	Ъ ъ	mute	Omit in transliteration
І і	І і	І і	і	do do	Ы ы	Ы ы	Ы ы	и и	in middle of a word at end . . .
К к	К к	К к	к		Ь ь	Ь ь	Ь ь	mute	Omit in transliteration
Л л	Л л	Л л	л		Ѣ ѣ	Ѣ ѣ	Ѣ ѣ	ye	yea
М м	М м	М м	м		Ѥ ѥ	Ѥ ѥ	Ѥ ѥ	e	a, in fate
Н н	Н н	Н н	н		Ю ю	Ю ю	Ю ю	yu	you
О о	О о	О о	о	o, in Loch	Я я	Я я	Я я	ya	
П п	П п	П п	р		Ѧ ѧ	Ѧ ѧ	Ѧ ѧ	f	
Р р	Р р	Р р	р		Ѩ ѩ	Ѩ ѩ	Ѩ ѩ	i	Seldom used
С с	С с	С с	с	Invariably sharp as a double ss.					

NOTE The termination *и* & *и* (adjective) should be transliterated *и*
Pronounced as *и* in Hygiene

translates Russian, or takes an interest in the subject, will look at them. I do not think there is anything particular to say about them. We have made very few alterations on the old system which was in force, but there were a few which were absolutely necessary in order to keep in harmony with the other rules to which I have alluded. There is, I think, only one point upon which we differ, and that is that the Geographical Society has adopted the symbol *zh* for denoting the French J, and the Russian Ж. We have not thought it advisable to adopt the *zh*, which is an awkward symbol as it contains two letters instead of one; and for all practical purposes, more especially for military purposes for which our rules are drawn up—and, of course, the first object in drawing them up is for military uses—the ordinary English J seems to be quite sufficient. I do not know whether any gentleman here will have any remarks to make upon this subject. As far as we are concerned, this is now the adopted system, and I am afraid we are not able to change it; but we should be very pleased if everybody who has to translate Russian would use our system, and we shall be glad to supply as many copies to the Secretary of the United Service Institution as he may like to have.¹

Mr. HENRY W. LOWRY (Indian Staff Corps): In reply to the invitation given by the Chairman that some Officers of the Indian Service should speak, having recently spent some ten months in Russia, I should like to say a few words. Many of us have indeed cause to feel grateful to the far-seeing and generous policy of the Indian Government, to which the Chairman referred at the conclusion of the last lecture, in giving the encouragement it has done to the study of the Russian language. I fear it is improbable, in spite of the impulse which has been given, that a knowledge of Russian will be at all general among the English people for a long time to come, and therefore great value should be attached to works of translation, such as that from Mr. Pollen, from which Mr. Cazalet read a good many extracts, both to-day and on the last occasion. It is, I think, a matter of encouragement to those of us who are students of the language to know that it is but a very few months since the author of this book passed his examination. I find, in that, great encouragement, for it is a signal compliment for any author to have received at the lecturer's hands so soon. One gentleman suggested at the last meeting that it was desirable some further encouragement should be given, and I understood the Chairman, in replying to him, to say that Government had already done so much in that way, he did not see what more they could do just yet. I think possibly the gentleman who made the suggestion had in his mind a system which prevails in India of giving just such further encouragement to the study of certain languages. After passing the "High Proficiency" test, which, I think, corresponds very much to the Russian "Interpretership" test, a *degree of honours* is offered, carrying with it a gold medal, and rewards varying from 4,000 Rs. for Persian, to 5,000 Rs. for Sanserit and Arabie, that is to say, roughly, from 300*l.* to 400*l.* That is a very material encouragement, and, I think, it will be allowed that if such a system prevails in regard to the languages I have mentioned, it is not unreasonable to hope that it may yet be introduced for Russian, the language of a country which has made, as Mr. Cazalet said, such enormous strides in the last half-century, and which both in influence and in power bids fair to overshadow the whole world, and which threatens at any moment to make its boundaries contiguous with those of another yet greater "Empire, upon which the sun never sets." Of the literature I do not like to say much. It is curious to note how many of the greatest Russian writers have found it expedient, or have been compelled, to reside abroad, or in distant parts of the Empire. Lermontov, Pushkin, Turgueniev, and Dostoievski, are all cases in point. I only give four names, but they are four which I do not think can be surpassed by any other four in Russian literature. I was told in Russia by a Russian gentleman that it is on record that Lermontov said, "If it had not been for the oppressive system adopted by the Government towards many of their best writers, some of the very best things in the language would never have seen the light of day." However that may be, it is known that he himself and Pushkin

* See table at the end of the discussion.

found in their enforced residence in the Caucasus an inexhaustible source of inspiration in the wondrous beauty of that wild mountain country, the unending variety of its inhabitants, and in the wealth of nature in that part of the Empire. With great diffidence I will mention the name of the author whose works have most appealed to me, of all I have yet read, that of Lermontov. The great beauty of his poems, and their singular simplicity of language, cannot fail, I think, to charm everyone; and the more so when we note how intensely human and natural is the sentiment which he expresses all through his works. There seems to be nothing strained or far fetched in anything that he has written. This is somewhat curious when we reflect that he himself is of a singularly cynical temperament, as is revealed to us in his only novel, "A Hero of Our Own Time," in which it is said, the hero is a portrait of himself by himself. I would just like to say one word about the Cossacks, of whom Mr. Cazalet gave us an interesting history. They form a very large proportion of the Russian army. An Englishman on first arriving in the country is apt rather to look down on the Russian soldier. He has a somewhat slouching figure, a coat very likely ill-fitting and nearly always dirty, long boots looking as though blacking was unknown to them, a rifle carried at any angle but the regulation one! One is apt to smile at this; but after a little while, when one has had time to note the deeper underlying qualities, his devotion to his Officers, his cheerfulness, his willingness to work all day, his endurance, and the absence of all grumbling, his fine physique (for some of these Cossacks are splendid-looking fellows); and further that they are, generally speaking, older and harder looking men than our own soldiers; having observed all this, one's opinion of the Russian soldier very greatly rises. As to their courage, I will only say it is a matter of history, even if it were not borne witness to by so many of our own Officers,—of whom our Chairman is one,—who were through the Crimean War.

Mr. A. LINDEN: May I be allowed, as a Russian gentleman, to thank Mr. Cazalet for his two most excellent lectures on "The Russian Language and Literature"? Being fully acquainted, of course, as a Russian gentleman, with the history, language, and literature of Russia, I can confidently say that a better lecture could not have been compiled within such a short compass, nor one so impartially and well sketched out. As to Mr. Cazalet's remarks in his first lecture that the feeling of Russians up to the Crimean War had been most favourable to England, I can only say, from my experience as an Officer during that War, and at the Siege of Sebastopol itself, that the feeling was much more friendly at the close of the war than it was at the beginning. I am quite sure that that good feeling towards England has since increased, and I hope it may always exist as favourable as it has been hitherto. From my experience of the Russian and English languages, I find that no language conveys so well the true meaning of English authors as Russian, and, on the other hand, the English conveys the homely life of Russia better than either French or German.

Captain LYNDEN-BELL (East Surrey Regiment): I trust, Sir, that this Society which is to be organized is with a view of encouraging the study of Russian chiefly among the Officers of the English Army, because, of course, very few in the Indian Army would be able to partake of the benefits of it. As an Officer who has spent six months lately in Russia, I should like to ask if it would not be possible for those who have the power to do it, to bring forward the question of increasing the encouragement for the study of Russian as far as the English Army is concerned. It may not be generally known, that English Officers cannot get *more* than six months in Russia to study the language, and I know I am expressing the lecturer's own view when I say it is most difficult to get a thorough grounding in the language such as would last and be of permanent use unless one stays at least a year in the country after the preliminary. The original plan, requiring Indian Officers to spend a period of *not less* than eight months, and generally ten months to a year, in Russia, may have been drawn up in view of their preliminary examination being somewhat different, as the elementary test is one quarter of the total marks; English Officers, however, are not allowed to go until they have obtained at least half the number of marks, when they are said to have "passed" in the language. Now I know that the "pass" has very often been obtained in three

months, and I know two Officers who have done it in two months, so that the Indian Officers obtain two to six months in Russia more than the English to compensate them for the difference in the preliminary examination between 0·25 and 0·5, which represents a month's work in England! No Officer or civilian; so far as I know, has ever yet succeeded in getting the interpretership unless he has studied at least a year after a preliminary examination; so that the preliminary is nothing compared with the final, although the preliminary is 0·5 and the final 0·8. I wish to ask if it would not be possible to bring forward the matter of English Officers having a further period to study in Russia, so as to put them on an equal footing with those who belong to the Indian Army. They get less reward: they get 150*l.* instead of 242*l.* 10*s.*, and they do not get the travelling allowance which the Indians do. They spend just the same, and travel as much, but they have not the same opportunities of studying the language; and, unless they are put on equal terms with the Indian Army, I do not think any Russian Debating Society would have a fair chance of success as regards the study of the literature, for its members would not be qualified to enjoy it nor to take part in the proceedings in Russian. I myself had a very enjoyable time in Russia; it was only too short. I worked conscientiously all the time, and all the Officers I knew worked at least six or eight hours a day; and two I heard of, worked fourteen hours a day. I think there is no complaint about the way in which the Officers use their time, and there is no complaint about the standard being too hard. It is necessarily high. The only thing I have heard complained of is that there is not enough time to do the work in. A gentleman in the War Office, who is an interpreter of Russian, told me, before I went to Russia, that people have no idea of the amount of work that has to be done in order to reach the interpreter's standard. It is at least a year's hard work. I asked if it were possible to do it in six months, and he replied that he did not think it was. I think if we could put the English Officers on the same footing as the Indian Officers it would give them a greater insight into Russian literature, and it would enable them to appreciate its further study. As regards the Russian soldier, I am perhaps not qualified to speak very much, but I spent three months at a country house 75 miles from Moscow, just opposite a large artillery camp, where I had an excellent opportunity of observing him, as I used to fish every day in the river close by, and knew some of the Officers, and went almost daily through their camp. I can corroborate what the last speaker but one said about the appearance of the soldiers. Although they at first, from their "slackness," excite ridicule, their physique is really splendid. There were eight brigades of artillery, and each brigade had six batteries, and each battery eight guns. A Russian Officer, whom I knew very well, told me they had thirteen similar camps in different parts of Russia, besides infantry and cavalry camps; and in passing through Warsaw I was fortunate enough to see the annual inspection of a Cossack regiment; the physique of these men was just as good.

Mr. F. J. MIRRIELES: I should perhaps apologise in a military circle for making any remarks on this occasion, but I should like to take the opportunity of saying that I do not think anyone who has listened to the most interesting lectures which Mr. Cazalet has given, both to-day and last Friday, can fail to have admired the lucid manner in which he has put the subject before us. Such lectures, I venture to think, claim greater publicity and a wider audience than is offered even by the distinguished company present here to-day. I believe that that publicity will be given in the printed reports which will appear in the Journal of the Institute. Then those Officers who have not had the opportunity of personally hearing Mr. Cazalet—in fact, those Officers who have passed in review before him as Examiner, on behalf of the War Office, in the Russian language, and others who may yet have to run the gauntlet of that ordeal—will have the opportunity of reading matters of such great interest, freed from any anxiety they may at other times have felt on the score of examinations. As regards the lectures themselves, in the brief time at Mr. Cazalet's disposal, it would not have been possible to touch on every matter coming within the range of so comprehensive a title as "The Russian Language and Literature;" and, if I might make a suggestion to Mr. Cazalet, I am sure it will afford immense interest if he would on a future occasion, either

here or in the rooms of the Society which we may hope to see formed, continue his course of lectures, and take up, for instance, that feature of the language and literature which is comprised in the "Russian Folk Lore," as exemplified in their beautiful national songs. The music is most beautiful, and, being generally in the minor key, is frequently melancholy and pathetic, but at the same time entirely free from that sickly sentimentality which is so often found in our modern English love songs. If I might take the opportunity in the august presence of the Examiner, I should like to mention some of those songs just to exemplify my meaning. Take, for instance, the National Opera, "The Life of the Czar," by Glinka. There is a most exquisite air: it commences "Kak mat oubili;" and, by the same composer, the beautiful song "Ne iskoushai menia bez noudji." Take again that charming appeal, entitled "Matoushka goloubushka," and also Pushkin's touching words, set to music by Sheremetieff, one of the most beautiful songs imaginable. I might also refer you to a song by Count Kousheleff-Besborodko, which is not perhaps so well known. It runs "Tebia sdez niet, no to somnoi." The secret of the charm of these songs lies in their simplicity and homeliness—a very characteristic feature of the Russian nation. The audience would, no doubt, be better able to judge of these songs if they could hear them; but I am sorry I cannot oblige. Perhaps, however, on a future occasion, if the Society is formed, and all the gentlemen present duly qualify for compulsory Russian (no doubt some already have qualified), and if you only widen your doors sufficiently to admit some of that talent from the country of which we have been speaking, you will then have the opportunity of appreciating the beautiful songs of the Russian nation, and of hearing more about their interesting language, which is at present so little known in this country. One speaker mentioned a significant circumstance, namely, that four or five of the most famous Russian authors had not been able to remain in their own country, and some had sought an asylum in ours. What an opportunity, in a Society such as is proposed, for including and associating with some of the most talented men of Russia, and if by chance any of them should be political refugees, I hope that fact would form no barrier to their admission. I believe that the Society would foster the appreciation of a nation too little known among us, except in a very narrow circle, and it would also help to dissipate many foolish beliefs regarding a country and a people from whom we have much to learn. Personally I have many associations with Russia, and it would afford me pleasure to join a Society of this description; but, apart from such reasons, I believe that a Society so constituted would afford an opportunity for the expression of practical sympathy with a sister nation at a time, for instance, like the present—when borne down by an appalling famine—which would, in its own quiet way, assist in cementing that bond of fellowship among nations which should be the universal aim of mankind.

Major J. WOLFE MURRAY, R.A.: I had not the pleasure, Sir, of being present on the occasion of the first portion of this lecture being delivered, which I very much regret, as I have listened with the most intense interest and pleasure to the portion we have just heard. I am sure no one is better qualified to lecture upon this subject than Mr. Cazalet, but so many compliments have already been paid to him that anything that I could say on the subject would be quite futile. I think the idea which has been put forward of a Society for encouraging the study of Russian is an excellent one, and one to which I should be glad to give any little support I am capable of. I only hope that we may see it realized very shortly. I think this lecture will do an immense deal of good if it leads us to pay more attention than we have hitherto done to the Russian literature. The value of that literature is very great indeed from many points of view. Without reading her literature it is quite impossible that we can appreciate the value and position of Russia, and to appreciate her value and position is for us a most important matter. We see, if we take up the daily papers, from time to time, the most extraordinary statements made about Russia—statements which arise from positive ignorance of elementary facts; and it is only by a study, not only of the higher, but of everyday Russian literature—in fact, only by a thorough acquaintance with the language—that we can arrive at anything like a proper appreciation of the situation of that country. Therefore, it is very important that we should try to give reality to the

suggestions which have been made so as to perfect our knowledge ; and I hope the formation of the proposed Society will improve us a little in that respect. It seems to me that the vast majority of people in this country are absolutely ignorant of the conditions of ordinary life in Russia, of the national sentiments, and of the national policy, in fact, of the whole tendency of national thought, and that ignorance arises entirely from the absence of knowledge, speaking generally, of the literature of that country. I hail with the greatest pleasure the opportunity which now occurs of dispelling that ignorance. As is natural in discussions of this sort, we have touched upon a variety of subjects, some of which are not exactly cognate to the matter before us. Russian examinations, and the qualification necessary for Officers to pass certain standards, have been brought before us. I think, Sir, that those matters are very well left in your hands to settle ; and I am sure, if it remained with you, you would give every possible encouragement, pecuniary and otherwise, to the study of Russian. I should like to throw out one suggestion, with the greatest diffidence : it is that the Government should take care they get value for their money. We give a good deal of encouragement to the study of Russian, and we have a number of Officers who do know a certain amount about the language ; but the danger appears to me that once they have the knowledge, they fail to keep it up, and that, unless some steps are taken to ensure that that knowledge is maintained, a good deal of the trouble and money expended will be thrown away. That, Sir, is a suggestion which I make with the greatest diffidence, and it is one which, from your official position, you are well able to ensure being carried out. Mr. Linden touched upon the good feeling which exists between the individuals of each nation. From my own personal experience, and from the hospitality I have met with on the few occasions upon which I have been brought into contact with Russians, I should say that that good feeling still exists, and exists unabated. I am sure it existed at the time of the Crimean War, not only among the Officers of the two Armies, but from the highest to the lowest in the land. I should like to relate a little anecdote bearing on this point, which was told to me by the late Sir William Miller, who at one time, if I mistake not, acted as our Vice-Consul at St. Petersburg. During the Crimean War, the Chief of the Police came one morning to make his usual report to the Czar, Nicholas I. He reported that nothing unusual had occurred ; but upon the Emperor pressing him, he admitted that a man had been arrested for assaulting an Englishman. "Indeed," said the Emperor ; "let me see the man ;" and the culprit was accordingly brought before His Imperial Majesty, who asked if he had any complaint to make against the Englishman. "Oh no," was the answer ; "but the English are our enemies, and I thought it right to attack him." "It is true," said the Emperor, "that we are at war with the English, but we have no quarrel with them as individuals. However, as you are so fond of fighting, you shall be drafted off to the Crimea as a soldier." He went the next morning. That exemplifies, I think, the sympathy with the English which then existed, and which, I believe, still exists, in the highest quarters in the Empire. It is my personal opinion that we Englishmen, individually, get on better with the Russians than with any other foreigners. Another point touched upon was the transliteration question, brought forward by Colonel Dalton. It is very essential that in transliterating Russian names, and in putting them on to maps, and so forth, they should be written so as to give some sort of notion of the way in which they are pronounced in the original. Doubtless the table which is now lying before us, and which represents the labours of the Intelligence Division and other learned bodies, such as the Geographical Society, is sufficient for that object. I cordially agree with what Colonel Dalton has said upon one point of detail, namely, that it is unfortunate that we should have resorted to what I might call a hieroglyphic combination to represent the Russian letter "J." I cannot think that the majority of English people, for whom, and not for a few specialists, transliterations are made, can, by any possible stretch of imagination, pronounce the combination *zh* as "J." In proof of this, if there should happen to be anyone present who is familiar with the Russian language, I would ask him to look at the third line from the bottom of the synopsis of the first lecture, and see if, without any idea of what this combination *zh* is intended to represent, he could pronounce the distinguished author's name there given (Zhukovski).

The CHAIRMAN : As no one else wishes to address the meeting, I will not detain you very long, except to add a few words to what has been said. As Major Murray said, several subjects have been touched upon which do not, at first sight, appear naturally to flow out of the lecture. At the same time, when one considers that the lecturer, in coming here for this purpose, was, in a great measure, animated by a desire to address those Officers in the Army who are taking up the study of Russian, it was not unnatural that some of those subjects should be dealt with. As regards the inducements for Officers to continue the study of Russian, I am very sensible, from my official position, of the great necessity of their doing so, if it is to be of any value at all. I think I said a few words at our meeting last week on the subject, and I am also sensible of the difficulty with regard to it. One of the speakers was good enough to say that I should no doubt be able, if it came before me officially, to deal with it, and overcome the difficulty ; but it is not always so easy. It is now a year since the question was brought more especially to my notice, and I have in various ways considered what steps could be taken to encourage Officers to keep up their knowledge. I must say I found the only thing that appeared to me at all possible in the matter was to encourage their going to the country, to travel in it, or to reside in it ; because I am certain that to reside in a foreign country is the only way of really becoming fluent in conversation, and also of understanding the natives in their speaking. A person who studies a language may get on fairly well with a master ; and yet, whenever he comes to speak to somebody else, finds he cannot understand them at all. The Indian Government in this respect has been most liberal. They have given very great facilities to their Officers to go to Russia, and it will not have escaped your knowledge, that they have greater facilities than we have in the British Army, because, owing to the practice of giving long periods of leave in India, it is easier to arrange for those leaves of absence to be passed in Russia than it is in the British Army, where such long leaves are never allowed to Officers on full pay. Whether some special arrangement could be made is another thing. As the subject was mentioned, I only think it right to say that it has occurred to me, on looking over the results of the examinations in Russian, that I am not altogether sure that the Indian Government are wise in putting the decimal so low as .25, which enables an Officer to get leave to travel and reside in Russia. An instance has come to my knowledge of an Officer who, having obtained that very elementary knowledge of Russian, and thereby acquired the right to travel or reside in Russia, has come back again and failed to pass and get .5. It has occurred to me that that was owing to preliminary knowledge being too little ; because if you give an Officer leave, you ought to exact a certain amount of preliminary knowledge from him, in order that he may not find his first two or three months wasted in matters he might have learned in England. I mention that incidentally to show that it is a matter that has not altogether escaped notice. As regards the general question of the study of Russian, we all know that the study has been encouraged by the War Department on professional grounds ; but no one can fail to see that it is of great importance nationally, quite apart from the military reasons. I think there is probably less known by us of Russia and its inhabitants than of any other European nation. Speaking for myself and for most Englishmen, who have not much special knowledge of Russia, I think I am right in saying that our knowledge of that country is derived chiefly from what we read in the newspapers, and that must naturally be, in a certain sense, superficial and sometimes prejudiced. Judging ourselves by this standard, we may think that, possibly, other nations are not the only nations that are prejudiced. Sometimes we are ourselves a little. For instance, Englishmen think that no other nation has any right to have any aspirations whatever which would clash in any way with what we consider the sphere and aspirations of Englishmen. Therefore, probably, other nations think the same. Anything that would tend to remove these asperities, and bring people into intercourse, is no doubt of great advantage. I am sure, as a nation, we ought to encourage our countrymen to travel in Russia, and to acquire the language, without which such travelling would not be so profitable. As regards the friendship between the two countries (to which Mr. Linden so kindly alluded), I can only say that, from my own experience, I fully endorse what he said. I remember that, after the Crimean War, when the opportunity was given to mix

between the Officers of both Armies, there was the very greatest cordiality and courtesy preserved, without any exception. A few years after, I myself met a certain number of Russians, who formed the Staff of the Russian Legation at Peking, and they treated us in a most friendly way. They exhibited every desire to give us information, and to obtain the most friendly intercourse with us, and without any regard to the fact that our presence there was not agreeable to them—politically or nationally. I think I need add no more to what I have said, except to express the hope that what has been suggested about a Debating Society may take root. It would be one admirable means that Officers and others would find for keeping up their knowledge of Russian; and Russians who come to this country will be very glad to find Englishmen who are able to speak their language, and converse with them. If such a Society should be formed, I need only say that I shall be very glad to hear of it, and to give such support as one who is unacquainted with the language is able to afford. I will not detain you further by saying any more. I know you will heartily join with me in thanking the lecturer for the trouble he has taken in coming here for two days to complete the lecture, which has been in many points most interesting, and not less so from the discussion which it has drawn out, and the views which have been expressed by many of those present. I will now, without further remarks, convey your thanks to Mr. Cazalet for his excellent lecture.

NAMES OF MEMBERS who joined the Institution between the 1st October
and the 31st December, 1891.

LIFE MEMBERS.

Chichester, A. A., Capt. 2nd Dorset Regt.	Brooks, S. H., Capt. 4th V.B. Manch. Regt.
Brodie, A. W. M., Lieut. Seaf. Highrs.	Parker, C., Capt. Brit. Guiana Vol. Militia.
Blood, W. P., Capt. R. Irish Fus.	
Durell, A. J. V., Lieut. Norf. Regt.	

ANNUAL SUBSCRIBERS.

Mudie, R. A., Lieut. 1st Forf. Arty. Vols.	Morland, T. L. N., Lieut. K.'s R. Rifle Corps.
Ogle, F. A., C.B., Col. R.M.A.	Lindley, J. E., Capt. 1st Drags.
Taylor, E. E., Capt. Ind. S.C.	Vyvyan, C. B., Capt. E. Kent Regt.
Nelson, Robert, Lieut. R.N.R.	Fitton, H. G., Lieut. R. Berks Regt.
Humphery, Percy E. M., Sub-Lieut. R.N.R.	Talbot, M. G., Major R.E.
Faux, E., Lieut. 3rd Lon. Rifle Vols.	Wintour, F., Major R.W. Kent Regt.
Hamilton, H. I. W., Capt. R. W. Sur. Regt.	Poynton, E. M., Major Som. L.I.
Murray-Campbell, G. R., Lieut. 4th V.B. R.W. Sur. Regt.	Shute, H. G. D., Capt. Colds. Guards.
Westmacott, D. W., Capt. 2nd Lon. Rifle Vols.	Arnold, E. C., Capt. 3rd Middx. Arty. Vols.
Macdonald, R. J., Lieut. R.A.	Bruce, W. W., Major 20th Middx. Rifle Vols.
Shore, Hon. Henry N., Com. (retd.) R.N.	Raper, A. G., Col. (h.p.) late N. Staff Regt.
Cockayne-Frith, R. C., Capt. 15th Hus.	Cary, F. W., Col. (h.p.) late E. Yorks Regt.
Watkis, H. B. B., Capt. Ind. S.C.	Hunter, A. T., Capt. Queen's Rifle Vol. Bde. R. Scots.
Johnson, Sir H. A. W., Bart., Major Yorks. L.I.	Huyshe, E. V., Major late Welsh Regt.
Shekleton, H. P., Capt. S. Lan. Regt.	Cooper, E. S., Capt. R.A.
Macbean, W. A., Lieut. R.A.	Scallon, R. I., D.S.O., Capt. Ind. S.C.
Stanton, H. E., D.S.O., Capt. R.A.	Turner, W. S., Lt.-Col. Brit. Guiana Vol. Militia.
Taylor, W. A., Capt. R.A.	Thomson, J., Major Brit. Guiana Vol. Militia.
Dawkins, H. S., Capt. R.A.	Swain, A. W., Lieut. Brit. Guiana Vol. Militia.
Cowan, H. V., Major R.A.	
Lomax, S. H., Major Sco. Rifles.	

FOREIGN SECTION.

THIS portion of the Number, hitherto the Occasional Notes, has now become the Foreign Section, and is reserved for articles, either original or compiled, on professional subjects connected with Foreign Naval and Military matters; also for notices of Professional Books, either Foreign or English.

The Council of the Institution wish that this section shall be developed still further, and I have undertaken to continue my Editorship during the current year, with a view of aiding them in carrying out this work. It seems to me possible to make this section, and consequently the Journal, the means of keeping our Members acquainted with all naval and military progress abroad *pari passu* with that progress; and I shall be glad to receive from members of both Services, including in the latter those of the Auxiliary Forces, suggestions, information, or offers of assistance.

It is desirable, further, that I should state that, as regards editing the Naval matter in the Section, I shall have the aid of Naval Officers, thoroughly competent to give good advice and to pronounce sound opinions.

It must, however, be borne in mind that, as the change from a quarterly to a monthly issue has been made in order to ensure the more prompt publication of the Lectures after their delivery than has hitherto been the case, the Foreign Section will, as a rule, be restricted in extent during the Lecture season in the first half of the year, and will be prominent in the second half.

It is requested that communications and books for review (the latter under cover to the Librarian) may be addressed to me at the Royal United Service Institution, Whitehall Yard, London, S.W.

LONSDALE HALE,

Colonel R.E. ret.

THE NAVAL SCHOOLS OF THE CHIEF CONTINENTAL POWERS.

(Continued from No. 167.)

Compiled by Captain W. TENISON, the Manchester Regiment, from papers in the "Rivista Marittima," by 1st Class Commissary DANTE PARENTI.

Germany.

THE Officers of the German Navy are recruited from amongst young men who have satisfied the conditions of a special examination, and have passed a medical inspection as to their fitness for the Service.

The instruction of the Cadets takes place partly at the Naval School (divided into two sections, one for Cadets, the other for Officers) and partly on board training ships for Cadets and for Sea Cadets.¹

As soon as admitted, a Cadet must embark on a training ship for about six months, after which he must undergo a special course of study, which also lasts six months. At the end of this course he has to pass a special examination for promotion to the rank of Sea Cadet. He then embarks on board one of the training ships for Sea Cadets for a practical course, after which the first examination takes place for promotion to the rank of Sub-Lieutenant without commission. After having served in that rank, either on board ship or on land, for six months, he is ordered to attend a special course for naval Officers.

The Cadets are admitted once yearly, usually in April; application for admission must be made in August or September.

A Cadet must send in with his application either a discharge certificate from a German gymnase, a certificate of his ability to pass into the last class of the gymnase, or a certificate that he has successfully passed as Army "aspirant."

The subjects of the examination for admission are:—

Arithmetic: The Theory of Addition, Subtraction, Multiplication, and Division, Roots, Proportions, Simple Equations, Decimal and Ordinary Fractions, Double Equations, Compound Interest, Logarithms.

¹ The following are the different ranks in the German Navy, with their approximate equivalent in the British Service:—

Wize-Admiral	Vice-Admiral.	Lieutenant zur See ..	Lieutenant.
Kontre-Admiral	Rear-Admiral.	Unter Lieutenant zur	
Kapitan zur See	Post Captain.	See	Sub-Lieutenant.
Korvetten Kapitan ..	Captain.	See Kadet	Midshipman.
Kapitan-Lieutenant .	Commander.	Kadet	Cadet.

(The term Sea Cadet will, however, be retained in this paper so as not to lead to confusion.)

Geometry : Elementary Geometry, Geometrical Constructions, and Application of Algebra to Geometry.

Trigonometry : Elementary.

Physics : General Properties of Bodies, Elements of Acoustics, Theory of Light, Heat, and Electricity.

French : Reading, Translation from German into French and *vice versâ*, Grammatical Analysis, Syntax.

English : Reading, Translation from German into English and *vice versâ*, Grammatical Analysis.

Drawing : The Execution of a Freehand Drawing.

Age.—The age of Cadets must not be more than 19, if they have completed the gymnasial course, or 18, if they have not completed it.

The Chief of the Admiralty may, however, make certain exceptions.

Board of Examination for Admission.—The applications for admission are sent in to a Board at Kiel, composed of three naval Officers, nominated annually by the Chief of the Admiralty to examine and decide whether the candidates may be permitted to present themselves for examination the following spring. Intimation of the decision of the Board is sent to the candidates or their parents; and those who are permitted to present themselves receive due notice to that effect from the Director of Naval Studies.

Examination for Admission.—Before the examination, the candidates are medically inspected by a naval medical Officer, assisted by one or more members of the Board of Examination. The examination takes place at Kiel, in the presence of the Board, who decide as to the result, and forward to the Chief of the Admiralty a report stating, if necessary, their opinion as to the advisability of allowing any unsuccessful candidate to present himself again. The Chief of the Admiralty orders the admission, and sends notice thereof to the candidates.

Training Ship for Cadets.—As soon as admitted, the Cadets have to take the oath, which, *ipso facto*, confers upon them the dignity of belonging to the Service. The candidates admitted are classified according to their age, due regard being had to those in possession of a gymnasial certificate, and receive their first naval and military instruction on board the training ship for Cadets. The ship cruises during the summer months, returning to Kiel in September at latest. Those Cadets who have shown themselves fit to prosecute their studies as naval Officers obtain at the beginning of September a certificate of service from the Commandant of the training ship. These certificates of service must be submitted not later than September 15 to the Chief of the Admiralty, from whom the Cadets will receive, in due course, their orders to attend the course of instruction at the Naval School at the beginning of October.

Their former classification may undergo some modification, according to the certificates they have received. If, during the cruise, any Cadet has proved himself unfitted to become a naval Officer, the Commandant, having taken the opinion of the Officers of the ship, will send a report thereon to the Chief of the Admiralty, who will

decide whether the Cadet should be rejected or not. In the event of a Cadet having been rejected, and of his future entrance into the Army, the certificate of having passed the entrance examination as a Cadet will exonerate him from the examination as an Army "aspirant."

Naval School. Examination for Sea Cadet.—The instruction in the Cadets' section of the Naval School has for its object the continuation of the special training of the Cadets, and their preparation for the Sea Cadets' Examination. At the end of a six months' course the Cadets are examined in the following subjects:—

Navigation, Naval Sciences, Artillery, Torpedoes, and Land Tactics, Arithmetic, Solid Geometry, Spherical Trigonometry, Chemistry, Naval and Military Orders and Regulations, Naval Law, Matters appertaining to the Service in general, Topography, French and English, including conversation.

The Director of Naval Studies sends at the end of the examination a report to the Chief of the Admiralty, and a list of the marks obtained by the Cadets, for conduct as well as for studies. The consideration of these reports will assist the Chief of the Admiralty in deciding whether to promote to Sea Cadets those Cadets who, by the result of the examination, have shown themselves fit for the post. If the cadres should be full, the newly promoted Sea Cadets will consider themselves supernumerary to the establishment until vacancies occur. They are classified by the Chief of the Admiralty according to the results of the examination, the reports on their conduct, and their service certificates. In the event of a tie, preference will be given to the one who has a gymnasial certificate; but this advantage is lost in the case of Cadets who have undergone a second examination.

Repetition of Examination.—Those candidates who do not present themselves for examination, but are, nevertheless, desirous of serving in the Navy, may, on the recommendation of the Director of Naval Studies, and with the approval of the Chief of the Admiralty, take part, together with the Cadets newly admitted, in the cruise on board the training ship, and subsequent course of studies; but a second repetition of the course is never permitted.

Training Ship for Sea Cadets. First Examination for Naval Officers.—Sea Cadets, as soon as nominated, embark on a training ship and remain on board for about two years. During this period they receive theoretical and practical instruction for promotion to Sub-Lieutenant without commission (*ohne patent*).

On the return of the training ship, the Commandant forwards a report on the services of each Cadet, in which he expresses his opinion as to his fitness and the progress made in his studies, in addition to reporting on his moral character and conduct. Should he be of opinion that any one of the Cadets is unfitted for this career, he must report the fact to the Chief of the Admiralty.

The Cadets have then to pass their first examination for promotion to Officers, the subjects of which are:—

Navigation, Naval Sciences, Artillery, Torpedoes, Submarine Mines, Steam Engines, Organization of the Navy, Naval Administration,

Ships' Crews, Officers' Duties, Honours and Salutes, Naval Law, Relations with young Officers and Men.

At the end of the examination, the Board sends to the Director of Naval Studies, who forwards it to the Chief of the Admiralty, a detailed report of the success obtained by each candidate. Those Sea Cadets whose record of service is not altogether favourable, and those who have not passed the examination successfully, may be employed by the Chief of the Admiralty while preparing for re-examination, and merit favourable marks for their character and private conduct.

*Promotion to Sub-Lieutenant without Commission (ohne Patent).—*Those Sea Cadets who have passed the first examination for Officers and have obtained a favourable certificate of service from the Commandant of the training ship do not obtain their promotion to Sub-Lieutenant without commission, unless they obtain the votes of all the Officers of the naval station to which they may be attached, their names having been sent beforehand by the Chief of the Admiralty to the Commandant of the station. If all the Officers are opposed to the nomination of a candidate, he must consider himself rejected; also, when a minority only of the votes are against him, if the reason for his rejection is valid. The Chief of the Admiralty adjudicates without appeal as to the admission or exclusion of a candidate, a list of the Officers who voted in favour of the candidate and the reasons for his rejection being duly recorded. Promotions to Sub-Lieutenant on the effective list take place as vacancies occur.

*Examination for Naval Officers on the Effective List.—*Sub-Lieutenants without commission are employed at the discretion of the Chief of the Admiralty, either on board ship or in some naval department on land, during the summer months. In the autumn they receive orders to attend a course of about eleven months' duration in the Officers' section of the Naval School, which may be either consecutive or interrupted during the summer months, at the discretion of the Chief of the Admiralty. Sea Cadets who have passed their examination, but have not yet been promoted, may also obtain permission to attend this course, in order to enable them to complete their theoretical education, and in preparation for the necessary examinations for obtaining a commission. This examination takes place at Kiel, immediately on the termination of the Officers' course, in the presence of the Board of Examination for Cadets and Officers. The subjects of examination are:—

Navigation, Rigging and Naval Tactics, Artillery, Steam Engines, Torpedoes, Mines, Naval Construction, Natural Sciences, Mechanics, Fortification, Land Tactics, Mathematics (Arithmetic, Algebra, Plane and Solid Geometry), Trigonometry, French and English, and Drawing.

On the termination of the examination the Board sends its report to the Director of Naval Studies, together with a table showing the results obtained. The Board may recommend, as specially distinguished, those candidates who have given proof of extraordinary or superior attainments, and may recommend a repetition of the examination for those who have been unsuccessful. In accordance with these recommendations, the Chief of the Admiralty grants to those

who have been successful a certificate of fitness as naval Officers, special mention to those who have distinguished themselves, and permission to repeat the examination to those who have been unsuccessful. Special mention confers the right of priority in the general classification. The Chief of the Admiralty may grant commissions at the same time as certificates of fitness.

The following documents are required before admission to the Naval School:—

1. Certificate of birth and baptism.
2. Social position of family.
3. Autobiography, written under the supervision of, and attested by, an official, detailing the place of birth, the rank of father, the family of mother, the parents' religion, whether both parents are alive or if there has been a second marriage, the candidate's religion, a tabular statement of the candidate's former studies, any illness he may have suffered from, changes of domicile, and the French and English authors he has read.
4. A statement of the education he has received, together with all school certificates.
5. Gymnasial certificates as before stated, or certificate of having passed the examination as "aspirant" in the Army.
6. A certificate from a swimming master; the candidate must have successfully passed through a test in swimming of at least half an hour's duration.
7. A certificate of fitness for the Service from a superior naval or military medical authority.
8. A deed guaranteeing a sufficiency of means for the purchase of the outfit, payment of fees for sustenance, &c.

Outfit.—The Cadet's uniform and wardrobe has to be provided, according to a scale strictly laid down, at the parents' cost, either from the public clothing establishments on the Baltic station, or from one of the furnishers of clothing approved by the authorities, through whom all payments must be made. The Cadets are provided with dirk and belt, also bed furniture and towels, at the public expense. A payment of 20 marks must be made monthly for repairs, &c. The Sea Cadet's outfit will also be furnished at the parents' expense.

Maintenance.—Parents and guardians must send in, together with the candidate's application for admission, a duly attested deed, binding them to pay all necessary expenses. All payments must be made in advance: that for the first four months immediately on the Cadet's admission, and afterwards monthly.

Medical Examination Certificate.—The medical certificate from a superior naval or military medical authority, furnished by each candidate for admission, must give precise information as to the constitution, chest measurement, strength, &c., also precise details as to the candidate's sight, as ascertained by the Snellen scale and by special colour tests. Any defect of vision or colour blindness will disqualify a candidate.

Disbursements.—The following are approximately the sums to be paid for each candidate:—

First Year.

Complete outfit on admission	800 marks.
Subsistence for twelve months	720 „
Supplementary ditto during attendance at the Naval School	150 „
Total ..	1,670 „

Second Year.

Sea Cadet's outfit	500 marks.
Subsistence for twelve months	720 „
Total ..	1,220 „

Third Year.

Subsistence for twelve months	720 marks.
Officer's outfit at end of third year	900 „

Approximate grand total, 4,510 marks, or 225*l.* 10*s.*

In addition to these disbursements, the candidate's family must guarantee for ten years from the date of his promotion to Officer an annual allowance of 600 marks over and above his pay.

The following is the document by which a parent or guardian binds himself to defray all necessary expenses:—

“I am acquainted with the orders promulgated by His Majesty for admission into the corps of naval Officers, and the regulations issued by the Chief of the Admiralty.

“I, therefore, bind myself to provide for the candidate (son, nephew, ward, &c.)—

“*a.* His first outfit on admission;

“*b.* A monthly subvention of at least 60 marks until his promotion to Officer, and to guarantee a monthly allowance of at least 50 marks in addition to his pay for ten years subsequently;

“*c.* To pay a supplement of 150 marks during his attendance at the Cadets' course of the Naval School; and

“*d.* To defray the expenses of outfit on embarkation on the training ship as sea Cadet, as well as those on promotion to Officer.

“Place.....

Signed.....

“Date.....

.....”

The Naval School and the Naval Academy.—The Naval School is divided into two courses, the one preparatory, the other for Officers. During the preparatory course, Cadets obtain all necessary instruction to enable them to obtain the rank of Sea Cadet, when they are admitted to the second course, which lasts two years. During this

time they receive practical and theoretical instruction on board training ships, and, at its termination (provided they pass successfully the prescribed examinations), they are promoted to Sub-Lieutenants without commission. A final course of studies of eleven months, followed by an examination and the suffrage of the Officers of the naval station to which they may be attached, places them in a position to receive their commission, when they are definitely admitted into the corps of naval Officers with the effective rank of Sub-Lieutenant.

At the Naval Academy, more advanced courses are held for Officers, to enable them to obtain a higher professional education, and to fit them for the superior appointments in the Navy. The instruction is divided into two courses, each of seven months.

Both at the Naval School and Academy, vacations are allowed three times in the year—4 weeks in the summer, 14 days at Christmas, and 8 days at Easter. Both School and Academy are under the supervision of the Director of Naval Studies. The School is under the authority of the Commandant of the Baltic Station as far as discipline is concerned, but as regards instruction and administration it is directly subject to the Admiralty.

The Director of Naval Studies is also Director of the Academy and Naval School; and, like the Colonel of a regiment, has authority over the civil and military personnel of both. He issues orders and superintends the instruction given, the studies of the pupils, and the interior management. He supervises the staff of Instructors, fixes the hours of instruction, and modifies the programme of studies when necessary. He is assisted by an Officer whose position is equivalent to that of the Commandant of a battalion, and whose duties are:—

To supervise the internal management of the Academy and School;

To control the duration of the studies and the attendance of the students at the Naval Academy; to inspect, daily, the Naval School; and

To look after the staff of servants, &c., attached to the School. Three Inspecting Officers are told off to look after the pupils and the details at the School.

In the event of the absence or illness of the Director, another Officer is detailed by the Chief of the Admiralty to replace him. An administrative Officer is attached to the School as Chief Secretary and Librarian; he regulates the administrative service, and has charge of the School library, of the library of the Academy, and of the central library of the Baltic Naval Station.

The general economic administration, and the regulation and preservation of the scientific collections, apparatus, models, educational books, fencing, and gymnastic appliances are entrusted to an administrative Officer, the Treasurer, in accordance with the instructions issued for the economic administration of educational naval institutions.

A naval medical Officer has charge of the sanitary department.

The staff of Instructors at the Naval School is composed of :—

- a. Ordinary civilian professors employed by the State.
- b. Officers and naval employés attached exclusively as Instructors.
- c. Officers, employés, and professors who are entrusted with instruction in addition to their other duties. They receive varying salaries fixed by the Admiralty, according to the importance of the instruction and the number of lectures they give.

At the Naval School the Cadets and Sea Cadets are quartered in the School buildings as far as the accommodation will allow. Those Officers and Cadets for whom no quarters are available must provide themselves with lodgings at their own expense. A mess is established in the School, of which all Cadets quartered there must be members. The subscriptions and payments thereto are fixed by the Director. The Inspecting Officer on duty must mess with the students, but Officers ordered to attend the Naval School must mess at the garrison Officers' mess.

All books, writing and drawing materials must be provided by Cadets and Sea Cadets at their own cost.

Marks and Examinations.—The Instructors, in weekly reports to the Director of Studies, communicate to him their opinion as to the progress and conduct of the pupils. At the end of every three months, preliminary examinations are held, to which the pupils are subjected in the following manner :—

The Director of Studies, having received from each of the Instructors a paper of questions, requires the pupils to solve them on the spot, under the supervision of the respective Instructors. When this part of the examination is over, the pupils are called up for public examination. A record is kept of the marks obtained for the solution of the questions, and in public examination at the end of each quarter, which are all added up together, and serve to determine the annual classification.

Annual Report.—At the end of the course for Cadets and for naval Officers, a meeting takes place amongst the Instructors, who record their opinion as to the procedure and result of the instruction, and bring forward, when necessary, any proposed modification in the programme, in the number of lectures, &c. The Director of Studies, in a special report to the Chief of the Admiralty, sums up the Instructors' reports, mentioning their proposals and adding his opinion thereon. He also makes a special report on the Instructors and the work done by them.

Officers of any rank may, in addition to those specially ordered to do so, attend the courses at the Academy as outside students, provided the Director of Studies assents thereto. The order to attend the Academy is given only to those Officers who, by their former services, their conduct, or their special talents, give promise that the opportunity given them to perfect their professional education will be of real advantage to the State. Candidates must send in their application before the 31st May to the authority under whom they are serving, who will forward it on, after adding a copy of the personal records of the applicant, to the Commandant of the station. The

latter, in his turn, transmits it, together with all documents necessary for establishing the applicant's suitability, to the Chief of the Admiralty, who decides on the merit of each. The lectures at the Academy are divided into two courses, from October to May, as follows:—

First Course.—A brief repetition of elementary mathematics, analytical geometry, fundamental principles of organic chemistry and of inorganic chemistry, and the whole of plain and experimental physics. Organization of the Navy, manœuvring and naval tactics. Land tactics from the general strategical point of view, having special regard to the conditions of engagements, disembarkations, &c. Fortification, especially as applied to sea coasts. The fundamental principles of naval law, and of international law. The study of observations, and the use of the most important astronomical and topographical instruments. The construction of harbours. Hygiene, especially naval hygiene. Geography in general.

Second Course.—History of naval warfare. Artillery. Torpedoes. Engines. Naval construction. Electricity. Nautical astronomy. Higher mathematics. Principles of national economy. Natural history of the sea.

Every student must take up at least one foreign language.

During the summer months, from May to October, the Officers attending the Naval Academy are employed on practical service, which is, however, limited to—

1. The Officers of the first course who have not yet had practice in surveying.

2. The Officers of the second course, as far as regards hydrographic exercises on board a ship attached to the station for that purpose.

3. Facilitating the use of nautical, astronomical, and topographical instruments, to practising astronomical observations, and carrying out the triangulation of a district with the necessary calculations.

Written Examination and Report.—At the end of December and April an examination is held in order to keep up the interest of the Officers and stimulate them to study, in which various problems are set for solution, the time allowed for each being limited to one hour. According to the result of these examinations, an Officer is permitted, or not, to attend the second course.

Eight days after the termination of the course, the Instructors make a verbal report to the Director as to the results of the instruction; on these the Director bases his report to the Chief of the Admiralty, as in the case of the Naval School. He reports individually on each student, bringing to special notice any who by particular assiduity or attainments deserve to be specially recognized, at the same time bringing forward the names of any who have proved themselves good linguists, or possess any special technical attainments. He also mentions the name of any student who, in his opinion, has proved himself unfitted to be permitted to attend the second course.

At the end of the second year every student obtains a certificate, in which are recorded the results of the several practical tests, and of

the written examinations, and the reports of the Instructors. These certificates are signed by the Chief of the Admiralty.

Other Schools.

School of Engineers, whose object is to instruct theoretically the different classes of engineers. The course begins in October and ends in March. The instruction is carried on in an ascending scale—engines, mathematics, mechanics, physics, chemistry, Service regulations, and languages.

School of Pilotage, divided into two classes, one for masters, the other for pilots.

Artillery and Torpedo Schools, established at Kiel in 1877.

School of Telegraphy. Commissariat School.

Divisional Schools.—For sailors and the personnel of the dockyards in the two naval stations, and the *Sectional School at Friedrichsort*. Their object is to assist the intellectual development of the crews during their hours of leisure. The instruction is imparted by engineers, warrant officers, and ordinary teachers. Corporals and sailors of good conduct may prepare themselves there for admission to the Schools of Pilotage and Gunnery. The Divisional Schools, as far as concerns the personnel of the dockyards, in addition to providing general instruction, tend specially to prepare those who, in the Commandant's opinion, are not sufficiently advanced for the Engineers' School.

There is also an examination for master carpenters.

The Sectional School at Friedrichsort tends to give to those gunners who aspire to the rank of corporal that degree of education which may be useful to them. Those students who distinguish themselves obtain the right to attend the Higher Pyrotechnical School. The courses are from 1st October to end of April.

Preparatory School.—For one-year volunteers in the Navy, who intend to pass into the Reserve at the end of their active service.

(*To be continued.*)

THE SPANISH ARMY IN THE CAROLINE ISLANDS.

Geographical Notice—Military Expeditions—Recent Events—Battles of *Oua* and *Ketan*.

By Don FRANCISCO J. DE MOYA, Capt., Spanish Artillery.

Translated by Lt.-Col. J. C. DALTON, R.A., D.A.A.G.

TRANSLATOR'S REMARKS.

THE article from which this is translated appeared in the "Memorial de Artilleria" for August, 1891. Unfortunately, it was unaccompanied by a map, and as the subject deals with a part of the world but very little known, a map is doubly necessary to illustrate and explain the letter-press. I have, therefore, prepared a simple map to show the *Caroline* Group, and an inset of the island of *Ponapi*, or *Ascension*, which was the scene of the sanguinary fighting herein recorded. The original article contained many typographical errors which I have endeavoured to correct; but there are a few names mentioned which I have failed to trace on any map.

J. C. D.

December, 1891.

I.

THE *Caroline* Islands or *New Philippines*, situated in the most northerly part of Oceania, were discovered by Magallanes, A.D. 1521. They are divided into three clusters: the Western, Central, and Eastern, and form an extensive archipelago of more than 500 islands, classified into 48 principal groups.

Situated in the middle of the Pacific Ocean they lie to the S. of the Mariana Islands, E. of the Philippines, and N. of New Guinea.

The geological conditions of the ground are of similar formation to those of the Philippines, of which they form a part in the Spanish possessions in Oceania. The extensive and endless series of islands and islets disseminated in the sea, but with identical orographic and climatic conditions, indicate to the enquiring investigator the presence of the Ancient Continent, destroyed by volcanic phenomena, to whose incessant action, and to the action of the sea, its soil, which is rich in basaltic groups and reefs of coral, is partly due.

The relative position of each of these islands cannot be exactly determined, but the total area of this group, which is one of the richest and most important in Micronesia, amounts to some 50,000 square leagues (about a million and a half square miles) lying between the 135th and 180th degrees of E. Longitude (meridian of San

Fernando), and between the Equator and the 12th degree of N. Latitude, some 3,000 miles from Manila.¹

Amongst the principal groups may be cited those of *Yap*, *Ualan*, *Hogolu*,² *Tugulo*,³ *Arrecifes*,⁴ *Ponapi*, *Uluti*, *Seniavin*, *Duperrey*, *Lukunor*, *Nukuor*, *Namuluk*, *Pimipenta*,⁵ *Ulebi*,⁶ *Tavugui*,⁵ and the Archipelagos of *Marshall*, *Gilbert*, and *Mulgrave*.⁷

The population belongs to the Malayan or Papuan race, of the same religious faith and customs as all the Oceanic populations: organised in isolated governments, mostly dependents of petty kings, of whom the most important resides in *Lamurech*.⁸ The number of inhabitants is over 70,000.

The conditions of civilisation of the tribes contend with the backwardness of the regions. The North Americans and Germans, who, for a long time past, have been watching these seas, have altered the native character considerably, causing it to be educated far above our atmosphere, and replacing the bows and arrows characteristic of the country by the modern rifle.

Up to now this archipelago, like those of the *Mariana* and *Palaos*, has produced nothing for Spain, which country has, almost ever since the discovery of these islands, left them to their own resources, with the exception of those occupied by the Spanish detachments from *Guajan*.⁹ The geographical position of this part of Oceania is the true key of the Pacific, and is destined to become most important, both for Colonial security and for trade between Asia and America. The day is not far distant when the Panama Canal will be opened, a circumstance which most certainly has not escaped the notice of European policy, and is shown, by the ambition of England and Germany to establish there their missionaries in order to obtain passively that which they never could by force. Of this method of conquest, a melancholy proof is the loss of the Spanish possessions in *North Borneo*, ceded to England in March, 1885, by the Protocol of *Jolo*, through which England obtained an extent of 50,000 square kilometres (19,320 square miles), now covered by the splendid possessions of *Labuan*, *Sandakan*, and *Caya*, the centre of the commercial life of the island, and a station dangerous to the future of Spanish Micronesia.

The climate of the Caroline Islands is mild, and the produce the same as in the Philippines. The prevailing winds are the N.E., from November to June, and the W. from July to October.

¹ The German-Spanish Agreement of 17th December, 1885, fixed the limits within which Spain can exercise jurisdiction as between 133° and 164° Longitude E. of Greenwich, and from the Equator to 11° N. Latitude.

² Or *Truk*.

³ Or *Pingelap*.

⁴ Or *Providence Island*.

⁵ These I cannot trace.

⁶ ? *Wolea* or *Ulie*.

⁷ Other important groups not mentioned in this list are *Palaos* (or *Pellew Islands*); *Lamotrek* (or *Swede Islands*); *Enderby Islands*; *Hall Islands*, &c.

⁸ ? *Lamotrek Island*.

⁹ *Mariana Group*.—J. C. D.

The Group of *Yap* consists of six islands. The most important, which gives its name to the group, was explored 6th January, 1858, by Alvaro de Saavedra, and is the largest and most important in the western part of the archipelago. Its soil is fertile and hilly, especially in the extreme north, the heights reaching 160 to 170 metres (525 ft.) in the *Buray* range. Its circumference amounts to fifty-four English miles, and the safest port is that of *Tomil*, lying between Capes *Tomil* and *Rull*.

The Island of *Ualan*, discovered 14th September, 1529, by the same Captain, is one of the most fertile in the archipelago, and has splendid anchorages. The ground is undulating, the hills being covered with a rich and luxuriant vegetation. From their structure and analysis they point to volcanic origin. In the central part, and commanding the entire coast, rises the peak of *Teyva* (? *Mt. Crozier*), some 700 metres (2,297 ft.) above the sea level.

The Group of *Hogolu* (or *Truk*), also explored by Saavedra, is made up of forty islets, of which only the centre ones are inhabited; they are equally fertile and luxuriant. Its surface is undulating and the islands in the centre of the group are loftier than the others; the circumference of the largest being about forty English miles. The position of the principal island, *Hogolu* (? *Ruk*, or *Moen*), is $9^{\circ} 21'$ N. Latitude (? $7^{\circ} 21'$) and 15° E. of the Island of *Guajan*.¹

The Island of *Ponapi*, one of the *Seniavin* Group, was discovered in A.D. 1542, by Ruy Lopez de Villaldos. The group is made up of sixteen islands, of which *Ponapi* is the largest, and some seventy English miles in circumference. The surface is very undulating, and the greatest heights are to be found in the east, where there is a mountain 950 metres high (3,117 ft.), and towards the north, which ends in a huge rocky peak with an elevation of 335 metres (1,098 ft.).

M. de la Gravière, who ascribes the discovery of these islands to the Russians, A.D. 1828, states that it was in this Island of *Ponapi* that the crew of the "La Pérouse" met with such a disastrous fate.

The Islands of *Duperrey*, discovered in A.D. 1545, are composed of three small low islets covered with dense forest, called *Mongol*,² *Ugai*, and *Aura*.

The Group of *Lukunor*, explored A.D. 1550, is made up of ninety islets, the most notable being that which gives its name to the group, owing to its fine semi-circular port, *Kamisso*, which affords safe anchorage, sheltered from the prevailing winds.

The Group of *Nukuor*, discovered at the same time as above, is composed of twelve small low islands, mostly inhabited.

The *Lamurech*³ Group, also discovered at the same time, is the residence of one of the principal petty kings (*reyezuelos*), and is composed of a considerable group of fertile and mountainous islands, with some good ports.

¹ Some 7° E. of *Guajan* would be nearer the mark.

² *Mokil*.

³ ? *Lamotrek*.—J. C. D.

The Group of *Ulebi*¹ was visited A.D. 1686 by the pilot, Francisco Lezcano, who counted up to twenty islands, most of which are inhabited.

We can maintain truthfully that all the islands, or the majority of those which compose the Caroline Archipelago, including those called the *Marshall* and *Gilbert* Islands, were discovered and explored by Spaniards during the whole of the sixteenth century, and beginning of the seventeenth. The want of means of communication, and the absence of obligation on the part of the Spanish Government to proceed to occupy them, caused the English and American explorers to appropriate, during their voyages, the right of conquest, as we see by many foreign geographers, who have kindly given to many islands the names of the naturalists who have explored their soil, or of the vessels which have anchored in their waters.

II.

The Caroline Islands have never been completely abandoned since their conquest, as is shown by the fact that the Government of the Archipelago has at times dispatched scientific and military expeditions for various reasons, and definitely occupied the islands A.D. 1700. Amongst these expeditions, the following are especially worthy of mention:—

- (1) That of 1526, under Toribio Alonso de Salazar, composed of two boats and fighting men, who, after visiting some of the islands on the Western side, put in at *Palaos*, where they left missionaries.
- (2) In 1529, under Alvaro de Saavedra.
- (3) In 1543, under Ruy Lopez de Villabolos.
- (4) In 1565, under Miguel Lopez de Legazpi.
- (5) In 1595, under Pedro Fernandez de Quiros.
- (6) In 1686, under the pilot, Francisco Lezcano, who gave the name by which they are known (Caroline Islands) in honour of King Carlos II.
- (7) In 1697, organised by the Jesuits.
- (8) In March, 1708, by the same, with missionaries of the Order and twenty-five soldiers; but neither of these two last arrived at their destination, owing to difficulties of navigation.
- (9) In 1709, organised in *Cavite*² by the experienced pilot, Miguel de Elorriaga, composed of two missionaries and thirty soldiers.
- (10) In 1710, under sergeant-major D. Francisco Pradilla, with ninety native soldiers and four Jesuit missionaries, which disembarked in the island of St. Andrew, or *Sonrosol*. This expedition made the first map of the Archipelago, and gave the first martyrs to the Faith.
- (11) In 1712 the Jesuit Father Rafael Serrano organised another

¹ ? *Ulie* or *Wolea*.

² In the *Island* of *Luzon*, near *Manila*.—J. C. D.

expedition, composed of thirty soldiers and four missionaries, in the hope of rescuing what remained of the former expedition in *Sonrosol*; but the vessel (*patache*), which was commanded by the famous D. Blas de Lezo, was wrecked in the rocks of *Marinduque*, and the whole party was drowned.

- (12) In the same year, 1712, the ship which led the "*Real Situado*" to the Mariana Islands succeeded in disembarking in the above-mentioned island (*Sonrosol*), and heard from the natives of the glorious martyrdom of our mission.
- (13) In 1731 the Jesuit Father Antonio Cantova organised an expedition of four Jesuit missionaries and twenty native soldiers, disembarked in the *Yap* Group, where they definitely established themselves, and commenced their work of Christianising.
- (14) Following this expedition, another left *Manila* in May, 1733, under the Jesuit Father Victor Ubalteco, consisting of a religious mission with forty native soldiers and one Officer. This party disembarked in the island of *Talalep*,¹ and heard of the disastrous fate of Father Cantova and his companions.

III.

In some of these islands the spirit of adventure has gone so far as to found factories and establish missions, as in the island of *Ponapi*.

This fine island, which, from its importance and position, may be considered as the capital of the eastern part of the archipelago, is situated 7° N. Latitude, and 158° 15' Longitude (E. of Greenwich), and is in shape somewhat elliptical, the major axis being some 17 kilometres (11½ miles) long.

In the year 1852, four missionaries proceeding from North America, disembarked here, and were so successful that ten years later they had become absolute masters of the greater part of the archipelago, in which they had 5 missions, 12 ministers, 13 evangelisers, and 23 native masters; 43 schools, with about 4,000 members; 3 upper schools, besides a quantity of elementary schools, with an attendance of 2,000 pupils. There are, moreover, in *Oua*,² 250 Christians, a printing office for reformed propaganda, and a fleet of small vessels for the necessities of the Colony.

There were not wanting Spanish missionaries; but owing to the competition with the Americans, who had greater advantages, their work was made more than difficult; it was impossible.

International events at home, in 1875 and 1885, obliged the Spanish Government to establish regular forces in that part of its dominions, the Governor of the island at this time being D. Isidro Posadillo, Captain in the Navy, who, at the head of a mission of Capuchins and fifty of the Philippine Disciplinary Corps, took official possession of the island, his only support on which to fall back being the "*Maria*

¹ *Falalep* (*Uluti* Group).

² *Oa* on east coast of *Ponapi*.—J. C. D.

de Molina," a useless vessel (pontoon) which had taken three months to make the voyage that an ordinary ship can do in about twelve days.

What happened in the island? It is difficult to say. General opinion seems to aver that the rivalry between the Catholic and Protestant missionaries caused the conflict, which fermented amongst the natives the desire to rebel, the result being that in one and the same day the Spanish soldiers and priests, as well as the foreign ministers and settlers, were massacred.

We will detail the events which occurred. On June 30th, 1887, the *Kanacas* (natives) whom Posadilla had to work in the Colony disappeared from the works, and on his enquiring through an interpreter the motive for this desertion, he was informed by the petty kings "That though the Governor might be Governor, they were kings there, and could do more." These words left no doubt as to the attitude of the *Kanacas*, so Captain Posadillo ordered Alferez (Ensign) Martinez, with twenty-four men, to punish this insolence.

This small force encountered the rebel tribe near the town of *Jocoy*,¹ where, at the first shots fired, twelve of the Disciplinary troops went over to the enemy, leaving the gallant Martinez alone with twelve men. He and his men made a desperate resistance, all (except one) dying heroically on the battle-field. One soldier alone survived the massacre; and badly wounded, and worn out, was able to bring the fatal news to the Spanish Colony.

Captain Posadillo, irritated at the news of the treason and defeat, harangued the force under his command, and at once set out in search of the rebels at the head of the forty men who remained, and was obliged, after a sanguinary struggle, to retire to Government House with only half his force.

In view of the serious state of affairs and fear for the future, Posadillo at once arranged for the embarkation on board the "*Maria de Molina*" of the Missionary fathers, the women and children, whilst he himself, with the diminutive force left to him, entrenched himself in his position and awaited the onslaught of the rebels. On July 2nd, 1887, he was attacked by the *Kanacas* in force, and with great bravery held his post during the 3rd and 4th, after which, want of men, rest, and ammunition, determined him to embark on the ship, by which means, on the morning of the 5th, favoured by a torrential rain, and believing he had not been observed, he effected his retreat, and gained a boat which was awaiting him on the beach; but hardly was he embarked when a considerable number of *vintas* (natives) threw themselves against the fugitives, who had to engage in another titanic fight, which in spite of the disproportion in numbers would not have been so disastrous, had not the boat, which in the ardour of the contest was left without a helmsman, struck on the reefs, on which the slaughter was terrific, only two natives succeeding in gaining the ship by swimming.

In this memorable and desperate contest, the brave Captain Posadillo, mortally wounded in the chest with four bullets, defended

¹ Not marked on map.—J. C. D.

himself like a hero, and finally succumbed to the hatchet blows of the infidels. The valiant Dr. Cardona, who had joined the detachment on hearing of the defeat, and who, though seriously wounded, attended to the soldiers before himself, died heroically with his chief.

The resistance of the Spaniards, nevertheless, lasted some hours : and the night of the 5th July, 1887, came to cover with its gloomy pall that day so disastrous in Spanish history. At daybreak on the 6th, the Spanish Ensign no longer floated over the Caroline Archipelago, and half-a-dozen badly wounded men, and a few terrified and prostrated missionaries and defenceless women found themselves on board the ship, struggling to get to land, ashamed of their impotency.

It is not our object here, when relating these events, and showing up the abandonment of our forces in our Southern possessions, to suggest the energetic measures which are necessary, and which evidently do not consist in isolated expeditions of 100 men, and therefore, we continue our narration.

Subsequent to these unfortunate events, which in addition to the irreparable loss above quoted, involved the country in fresh diplomatic troubles (with Germany), another sanguinary occurrence happened in the same island. Lieutenant Porras, who commanded the post, and twenty-seven soldiers were surprised while in the act of constructing a fort, and barbarously assassinated by the *Metalunim*¹ tribe.

IV.

The attitude of the population of the islands towards the Spanish arms could not have been more hostile ; it was absolutely necessary to vindicate the honour of the Spanish Flag, and the Government, recognising this, organised a military expedition in *Manila* of 400 men under the command of D. Isidro Perez de Soto, Colonel of Infantry, with Major Victor Diez Martinez of the Artillery, as second in command. The force was made up of one company of the 2nd Battalion of Peninsular Artillery under Captain Monasterio, with Lieutenants Fandos, Sergio, and Bebrean (attached) ; two companies of Native Infantry of the 68th and 73rd Regiments under Captains Sastre and Abriat, and one company of Marine Infantry under Captain Vazquez.

This expedition embarked at *Manila* on August 15th, 1890, on board the war cruisers "*Velasco*" and "*Ulloa*" and the merchant steamer "*Salvadora*" with munitions and victuals for the campaign, and picked up at the island of *Jolo* the company of the 74th Regiment under Captain Romerales, thus bringing up the total strength of the force to 100 men. On the 1st September, 1890, the expedition arrived at the Island of *Ponapi* and disembarked, being joined by the company of the 71st Regiment under Captain Vilches, which garrisoned the island. It was settled at a council of war, that the *Metalunim* tribe should be punished first of all, as they had massacred the Spaniards.

¹ Island of *Ponapi*.—J. C. D.

The most logical plan would have been to attack the town of *Oua* by sea, in order to get at the rebel tribe which was strongly entrenched some 11 kilometres ($6\frac{7}{8}$ miles) from the settlements, and therefore, rendering an expedition by land exceedingly risky. The country in which the rebels were, was absolutely unknown, and they were defended by a thick forest full of natural obstacles.

Colonel Soto, in opposition to the general opinion, decided to operate by land, and therefore, on the 13th September, 1890, leaving one company of infantry in the settlement, he took command of all the forces and marched in search of the enemy. When only $1\frac{1}{4}$ miles on their way, the column found it necessary to cross the forest; paths had to be cut with hatchets; a heavy rain descended and spoilt all the month's provisions, and after a terrible night spent in the forest, during which the downpour continued, the worn out column was forced to return to the settlement.

In view of this *fiasco* and the practical demonstration of the impossibility of operations by land, the column next embarked, and on the 16th September, 1890, disembarked on the beach of *Palitipao*,¹ and under the protection of a cannonade from the ships took up positions and camped in the *bajais* (*sic*) which had been abandoned by the natives. On the night of this date, Colonel Soto, who had shown signs of anger and moodiness since the affair in the wood, and also considered his military reputation damaged because he had promised to take the expedition by land without having succeeded, committed suicide by firing off his revolver into his mouth while lying down on his camp bed. This unexpected affair caused the expedition to be re-embarked in order to take the opinion of the senior Naval Officers who decided to march on *Oua*, where according to news, the rebels were entrenched. On the night of the 18th, the town of *Oua* came in view, the natives being entrenched on the shore. The bombardment by the ships prepared the way for the disembarkation which was effected on the morning of the 19th, Captain Monasterio being in command of the company of Artillery, and Lieutenant Terraza and Attaché Panfil being with another half company. These latter had arrived a few days previously in the "*Antonio Muñoz*." Then the companies of the Native Infantry, Regiments Nos. 68 and 73, and the company of Marine Artillery disembarked, and in water chest-deep, advanced to the attack of the enemy's trenches, which, situated all along the shore, opened a brisk fire with slings and muskets. The result was that after six hours of fighting under the worst conditions, the Spaniards captured the trenches with a loss of twenty killed and wounded.

The chief glory of the day fell to the artillery led by Capt. Monasterio, and Lieutenants Fandos, Sergio, Terraza, Cebrian, and Panfil, who assaulted and took the enemy's position at the point of the bayonet under a hail of bullets.

The enemy, disorganised, fled for the town, taking refuge in the buildings and Protestant church from which, notwithstanding its white flag, they opened a lively fire, but were soon dislodged by the

¹ *Pillopletao* River.—J. C. D.

victorious troops, losing altogether in the two actions over 100 killed and wounded.

This important military operation terminated with the complete occupation of the territory of *Oua*, the buildings of which, as well as those of *Harra*,¹ *Chalapap*,² and the Protestant convent were devoured by flames; the entrenchments on the beach, mostly composed of great trunks of trees protected by deep ditches, being also destroyed. The following distinguished themselves in this engagement, viz., Captain de Beltran de Lis (infantry), who was badly wounded, the Capuchin Father Augustin de Ariñes, Chief of the Mission of *Metalanim*, the Portuguese Guide Cristian Barbu, and the German subject Herr Narmu, Port Officer.

On September 25th, 1890, the "*Antonio Muñoz*" left *Ponapi* bearing the official despatches and conveying the wounded. The Spanish troops who returned to *Santiago de la Ascension*³ agreed while awaiting orders from *Manila* to fortify the town, so as to make it a fixed base, and a Defence Committee was organised.

The Spanish force was 500, as opposed to 700 *Kanacas* who fought at *Oua*, who, supplied with repeating rifles (*fusiles repetidores*) and swivel guns ("*Lantacas*" ó *pedreros*), occupied an advantageous position, whilst the Spaniards had to manœuvre on a muddy beach. In the action of the 19th the enemy lost over 100, including the Chief Chaulik killed, and four other chiefs wounded.

Soon after the capture of *Oua*, the North American corvette "*Alliance*" arrived in the waters of *Ascension* (*Ponapi*), having been sent by the United States Government to protest on behalf of the missionaries and merchants against the burning of their possessions. Señor Cadalso replied in patriotic and suitable terms.

On November 1st, 1890, another expedition embarked in *Manila*, consisting of 200 men, composed of half a company of Peninsular Artillery, under Captain Aguado, and one company of Native Infantry, No. 74.

It arrived at *Santiago*⁴ on the 14th November, and made a reconnaissance on shore along the *Guiti*⁴ road as far as the confines of *Metalanim*, which was successfully shelled by the navy; and on the 16th two columns of attack were organised, the first composed of Captain Monasterio's company of artillery and two companies of the line, all under Captain and Brevet-Major Diez de Rivera of the Artillery; the second was composed of Captain Aguado's company of artillery, one of infantry, and Colonel Serrano's company of marines. The plan of campaign was that the 1st column should advance and attack in front the town and fortifications of *Ketan*,⁴ situated in the centre of *Metalanim*, on the river *Pitapitam*,⁵ whilst Colonel Serrano's column was to enter by the forge to hem in the enemy, entrenched to the number of 1,500 in the stockades (*cotas*) of *Ketan*; signals

¹ *Haru*.

² Not on map.

³ Not marked on map. Probably the chief town of *Ponapi*.

⁴ Not on the map.

⁵ *Pillapletao* River.—J. C. D.

being agreed on to ensure a simultaneous attack on the 22nd November.

The columns therefore embarked, the first for *Oua*. in the steamer, "*Cebu*," and the second for *Metalanim*, in the cruisers, "*Velasco*," "*Ulloa*," and "*Manila*," in order to commence operations.

The column under Captain Diez de Rivera, disembarked at 10 A.M., assembled on the beach and advanced on the morning of the 22nd, at 5 o'clock, arriving at 9.30 in view of the town of *Marchichao*,¹ where the *Kanacas* had established their trenches. These were taken by assault, the artillery in the van, after a struggle which was maintained for three hours; the Spanish losing fourteen men and Captain D. José Vilches of the infantry, who was mortally wounded in the chest when leading on his men, and died four days later.

Having completely dislodged the enemy from these positions, and having destroyed the town, the column continued its march with the assistance of the compass, the only means of orientation in this unknown country, and encountered at 4.30 P.M. in a clearing of the wood, before the town of *Ketan*. the formidable *cotas* (? stockades) of which commanded the country round. These were defended by two lines of fire, and established on high and thick loop-holed walls, constructed of trunks of trees and stones, and defended by deep ditches full of hidden rocks.

The position of the Spanish force before the action, which was the fiercest and most sanguinary in the whole campaign, was as follows:—In front the enemy's fortifications. on the left, the sea, of which the prolonged low and unknown reefs rendered the approach of the Spanish ships dangerous: and on the right, the wood which the force had crossed.

The column of Colonel Serrano, which was to have disembarked on the evening of the 22nd November, 1890, did not do so until 4.30 A.M. on the 23rd, employing row-boats, steam launches, and canoes, under command of the second officers of the "*Ulloa*," and "*Velasco*," with the subaltern officers and midshipmen detached for this service. The boats, however, got aground, and the water being too deep for the troops to wade ashore, the disembarkation had to be made in the island of *Tamban*,² and the column had to cross the rocks, guided by a *Kanaca* prisoner, to whose help it was due that the expedition did not fail. This "contretemps" caused fourteen hours' delay, and entailed fatal consequences for the Spanish troops, and postponement of the glory hoped for, because Captain Diez de Rivera, impatient at not getting the signals agreed on, fretting at his passive situation, and his personal courage causing him to underestimate the difficulties of the undertaking, threw his column against the *Cotas* of *Ketan*, making three brilliant bayonet charges, which, notwithstanding that he reached the ditches, were unsuccessful, owing to the impregnable nature of the work and the numerous force opposed to him, who maintained a hot and incessant fire from muskets and guns.

¹ *Mijijao*.

² Not on map.—J. C. D.

In this furious and unequal combat, Lieutenant D. Coperino Fandos y Perez of the Artillery, met a heroic death, being mortally wounded by a bullet in the chest; moreover Lieutenant D. Emilio Sergio y Castro, and First Surgeon Cabezas were seriously wounded, two other Officers slightly wounded; the losses in all amounting to eighty-three killed and wounded. In this action all alike were distinguished by personal valour and warlike enthusiasm. More than three parts of the casualties were in the company of artillery which began the attack; the brave Captain Monasterio, who together with his valiant Lieutenants, gave a noble example to their men, escaping miraculously.

Lieutenant Castorino of the Infantry, who was contused, was detailed to select a strategical point to retire on, and the column under Captain Diez de Rivera, who was ever to be found at the post of danger, was forced to relinquish the attack, in order to collect its dead and wounded, and encamped on a small hill to await Colonel Serrano's column.

In this critical situation, without any means of alleviating the wounded, and without food, the night of the 22nd was passed, the troops being thirty-six hours without food after this sanguinary fight.

At 4.30 A.M. on the 23rd, they heard the bugles of the other column; at 6 a.m. they heard on their right, several rifle and cannon shots, which were the signals agreed on, and by 8 P.M., had joined Colonel Serrano's column, which had assaulted and taken the *Cotas* of *Ketan*, with the loss of twenty-five killed and wounded, the rebels being completely dispersed, and losing four guns and a quantity of arms and ammunition.

In this action which crowned the Spanish campaign against the *Metalunim* tribe, Captain Aguado's company of artillery was the first to enter the *Cota*, receiving the eulogiums of the commander of the column; Colonel Serrano bore himself brilliantly in this affair, and remained in *Ketan* for three days, until he had completely rased the town and defences, taking ample revenge on the *Kanacas*, the remnant of whom, fugitives and persecuted, succeeded in rallying after losing more than 200 men.

On the 20th November, 1890, the wounded were sent back to the settlement, where they still remained five days under provisional treatment for want of means, until they were conveyed to *Manila* in the steamer "*Urano*."

In the sanguinary combats which have been above attended to, noble heroic actions were innumerable. Only those who have served in those parts can realise the hardships and sufferings which have to be undergone. The first enemy is the climate, the next the unknown and unhealthy nature of the ground, and the greatest, the want of means of communication, of housing, victualling, and ambulance service. The wounded of *Oua* and *Ketan* were some twenty odd days under provisional treatment, owing to want of *matériel* and *personnel*, and this notwithstanding the self-abnegation of the surgeon to the expedition, D. Anacleto Cabezas, who was seriously wounded in the hand, when his services were most needed. The Government rewarded handsomely those who had undergone such sufferings by

numerous decorations, gratuities, and pensions, of which a long list is given in the original.

On the return to Spain of Lieutenant D. Emilio Sergio y Castro, in June, 1891, he was handsomely fêted by his brother officers of the Spanish Artillery, in honour of himself and of the other artillerymen who took part in this expedition.

Bikini or Escholtz I

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MARSHALL

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an agreement of 6.4.86

CDallou

92 Lt. Col. R.

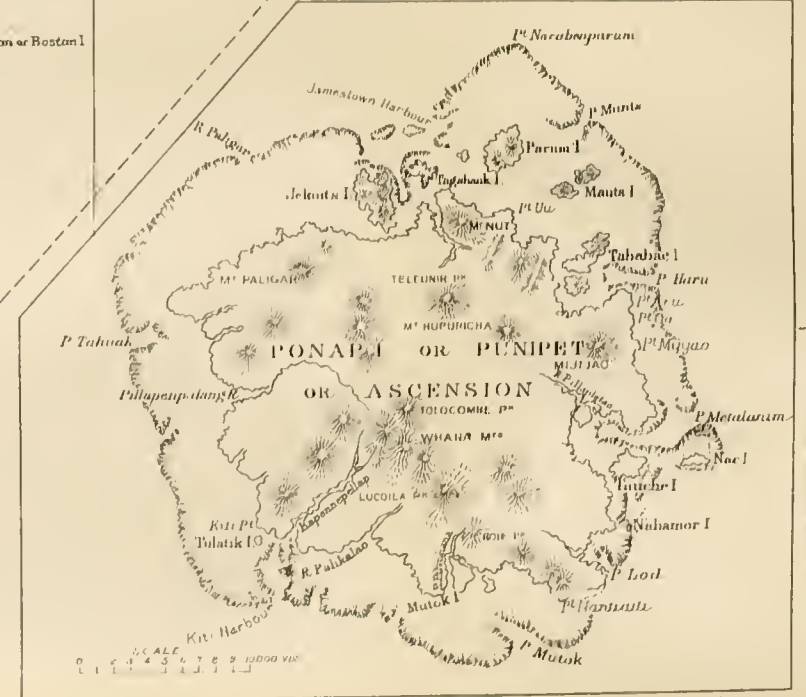
MARIANA OR LAUNCE I

German Spanish agreement of 17.12.85

Emu Island or
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Anglo-German agreement of 14.8.86
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CAROLINE ISLANDS

AND ADJACENT GROUPS.

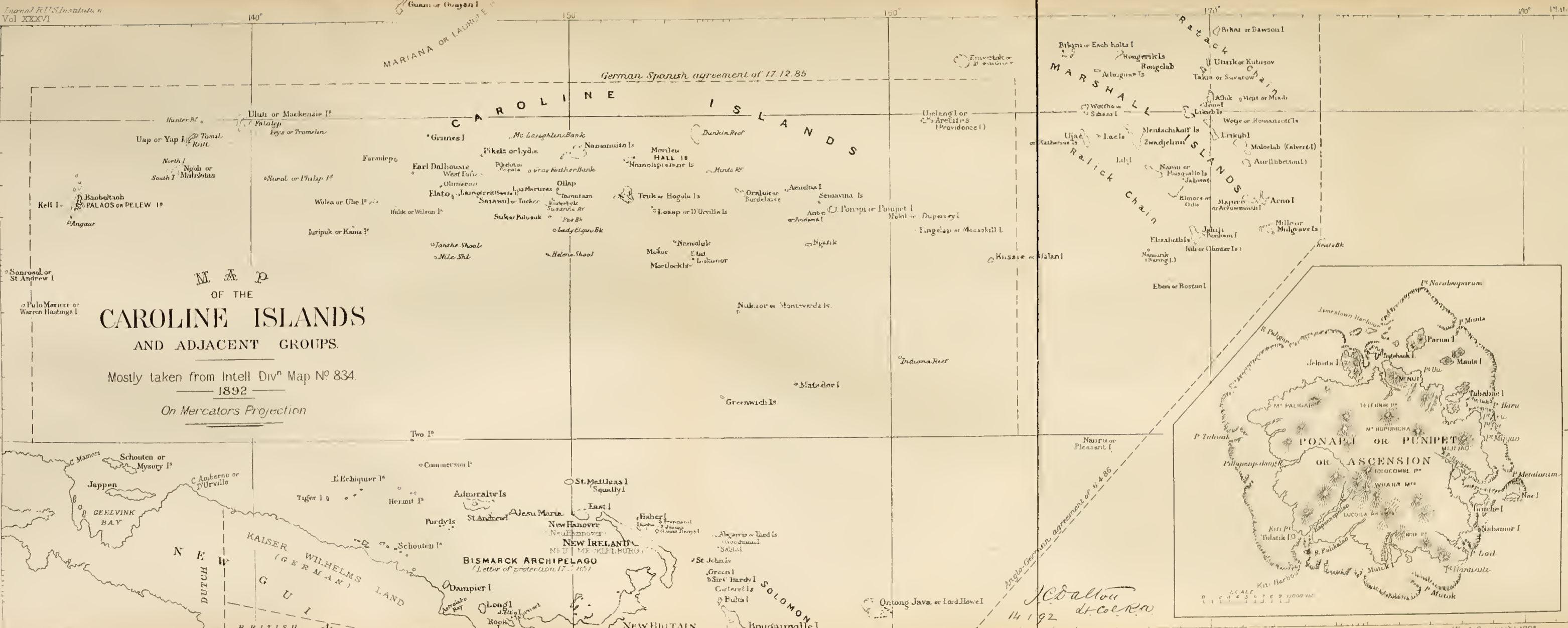
Mostly taken from Intell Divⁿ Map N^o 834.

1892

On Mercators Projection

M. A. P.

OF THE



PRÉCIS OF THE REGIMENTAL HISTORY OF THE 33RD EAST PRUSSIAN FUSILIERS IN THE WAR OF 1870-71.

Compiled by Major G. F. R. HENDERSON, the York and Lancaster
Regiment.

(Continued from No. 167.)

ON the 21st of November, the 2nd and 3rd battalions of the 33rd reached Compiègne, and the 1st battalion found quarters in four small villages close to the town.

Meanwhile, the Commander of the 1st Army had received instructions as to his future operations from the Royal Headquarters, dated November 18. These directed the occupation of Amiens, said to be strongly held, and ultimately of Rouen.

Up to the present, only a few districts of France were in possession of the Germans. Gambetta, the head of the new Government, was able, therefore, to arrange for the organization of fresh armies, which, assembled in outlying districts, were to be employed to break the line of investment already thrown round Paris. The north was especially well adapted for the purpose. Organization was made easy by the existence of many fortresses, where were quartered the dépôt battalions of seven line regiments and of four Chasseur battalions, with a large stock of weapons and uniforms. The dense population would also supply recruits in sufficient numbers.

Bourbaki was the first General of the northern force, but falling under the displeasure of the civilian authorities, he was replaced by General Faidherbe, who, being absent in Algeria, was, for the time, represented by Colonel Farre.

The latter, on the 19th of November, ordered his troops, now organized as the 22nd Corps, to assemble at Amiens on November 21, in order to defend the city against the rapidly approaching enemy.

On the 23rd, the advanced guard of the 1st Army came in touch with the French, and, after some desultory fighting, the latter fell back across the Luce. Their retreat led to the conclusion that they would confine themselves to the defence of Amiens. General v. Manteuffel, therefore, determined to concentrate the whole of the troops present; to await the arrival of the remainder of his army, and on November 28th to attack the enemy with superior forces.

The 15th Division had, on November 27th, to move to the left, in order to reach the position prescribed to it on the left bank of the Noye.

The following orders were issued by our Brigadier:—

“The brigade will assemble at 8.45 A.M. to-morrow, on the road leading from Moreuil to Ailly, south-east of Rovruel, where the road turns off to this village, in the following order :—

Advanced guard	{	1st Squadron hussars.
		1st Battalion, 65th Regiment.
		2nd „ „ „
Main body	{	1st Light battery.
		1st Heavy battery.
		Fusilier battalion, 65th Regiment.
		33rd Regiment.
		Pioneer company.
		Sanitary detachment.
		Ammunition columns, escorted by a company.

The 16th Division was to deploy near St. Sauflieu, advanced guard at Hébecourt. On the same day, Colonel Farre became convinced that he was about to be attacked, and strengthened his position with all speed. He expected that the advance would be made on the city from the east and south.

A continuous line of entrenchments was constructed on the heights of Petit St. Jean, lying on the left bank of the Celle, south of the town, at a distance of about 2,200 yards from the last houses, and running as far as the Somme at its junction with the Avre. Although this line was not completed when the army arrived, it nevertheless extended over a distance of more than five miles. There were only twelve guns, however, available for service. This consideration induced Colonel Farre to relinquish the defensive and to advance to the attack.

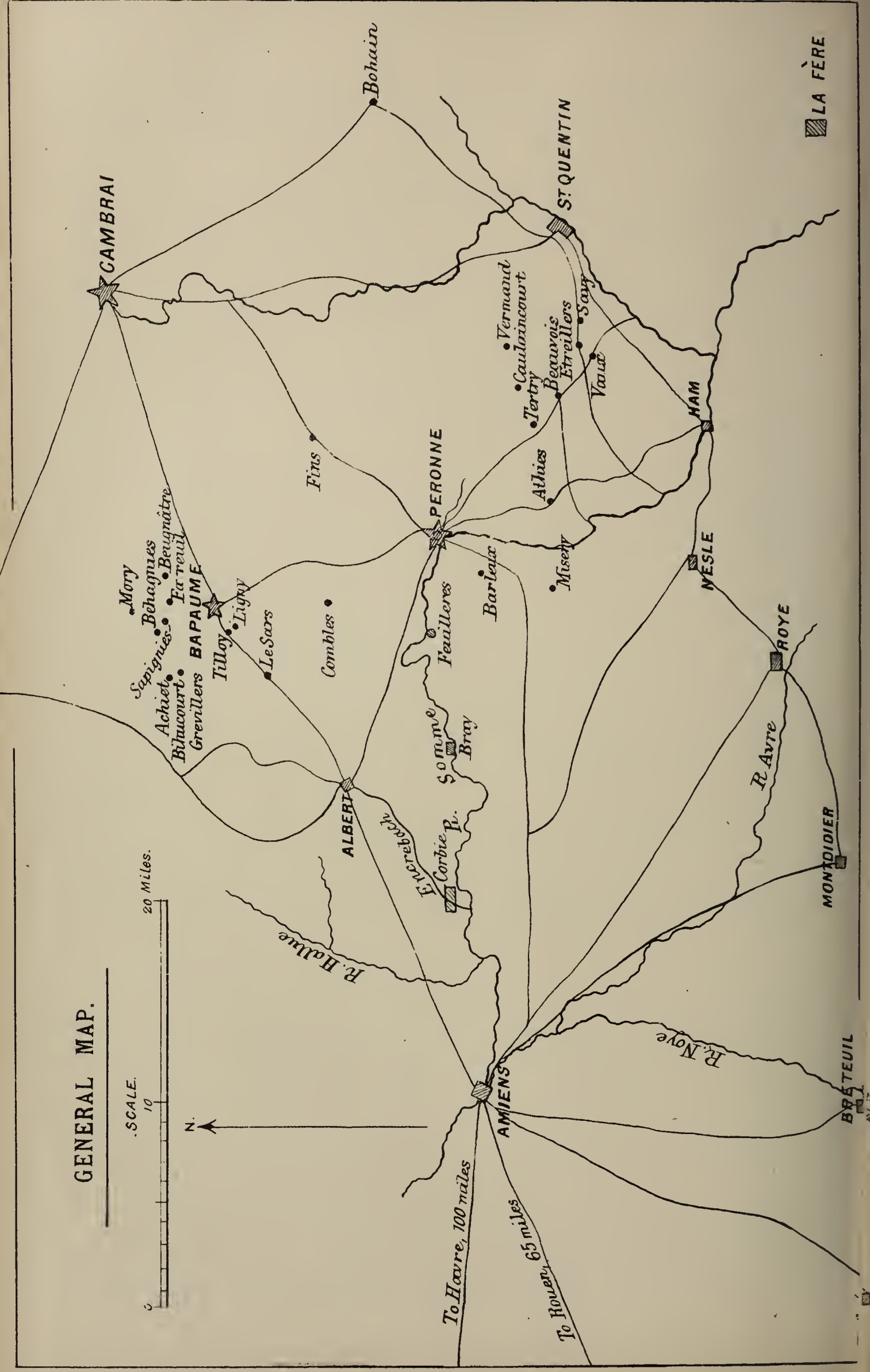
Thinking that he would meet with the strongest opposition from the south and east, he put two brigades at this point. His centre was but thinly held, and, as our march to the left had not been observed by his outposts and patrols, he had assembled eight and a-half battalions on his right.

On the 27th, we moved off at 9 o'clock, in dense fog. The 1st Corps marched by the road for Noye.

Just as its advanced guard from Roye was starting, information was sent in by the cavalry that the enemy occupied Gentelles, Cachy, and Villers-Bretonneux in force. These villages were just opposite the line Demuin-Thézy, which the Commander-in-Chief wished the 1st Corps to occupy.

The advanced guard immediately prepared for action, and occupied the woods of Domart, Hangard, and Morgemont, thus diverging to the right.

The remainder of the 1st Corps, following in the same direction, lost connection with the VIIIth Corps, which was coming up the defile between the Avre and Celle, and thus a considerable gap was made between the two corps, which, throughout the battle that ensued, could only be filled by a very weak detachment.



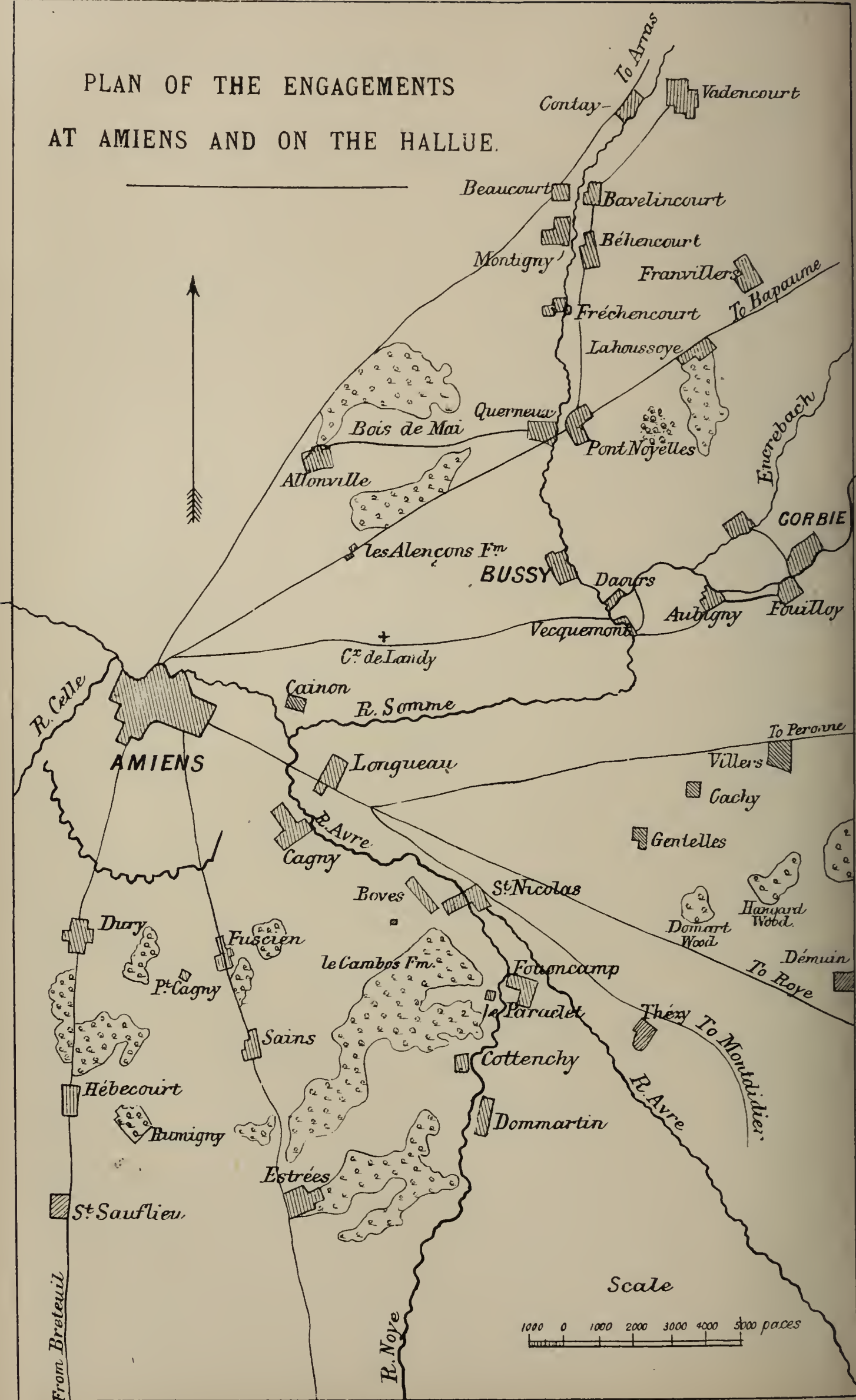
GENERAL MAP.

SCALE.
10
20 Miles.



LA FÈRE

PLAN OF THE ENGAGEMENTS AT AMIENS AND ON THE HALLUE.



The right wing was already engaged when the 15th Division came into contact with the enemy.

The 30th Brigade struck him first, moving in two columns, and a fierce fight broke out near Le Paraclet, on both banks of the Avre.

It was about 1.30 p.m. when the 29th Brigade reached its appointed position, the village of Sains. The battle on our right was plainly heard as we advanced.

The regiment was in the main body, and had already reached Sains and began to prepare quarters, when an order arrived to join in the action, in the direction of Le Cambos Farm.

Colonel v. Henning immediately directed the 2nd battalion to lay aside their packs, and to advance with the light battery to the farm. As the only support to the troops already engaged were the two companies in Sains, the Brigadier ordered our 3rd battalion to move up into line with the left of the 2nd. As soon as the Commanding Officer of the Fusilier battalion of the 65th came within range of the enemy, he ordered the colour to be unfurled. This was done amid ringing cheers, and served as a signal for the whole force to advance. At this moment the fog lifted, and the sun shone down, brightening the road to victory and to death.

Straight up the valley of the Avre marched the 65th, keeping to the high road. Over the hills, and through a plantation in the ravine between them, it pressed quickly forward, and on the left the 33rd moved directly on the ruin across the open fields. The batteries kept up a rapid fire. The infantry ceased fire. The 65th fixed bayonets. The drums beat "the advance," and cheers echoed on every side. Every now and again a man fell dying or wounded. This victorious onslaught lasted about eight minutes, and then we found ourselves within the ruin and the village close at hand. Here were stationed some companies of Mobs, or the 2nd Chasseurs, and of the 24th and 33rd of the line. The greater number took to flight. Only the more courageous, of whom there were not a few, awaited the onset. The hand-to-hand struggle was a brief one. The German 33rd disarmed the French 33rd, with many jokes.

The hill upon which the ruined castle of Boves stands is an isolated one, visible from a great distance, and higher than all the hills round. A deep moat surrounded the old castle walls, in which the enemy had found shelter.

The 3rd, 5th, and 8th companies of the regiment were the only ones which took part in the actual assault; the 4th and 6th had advanced round the base of the height on either flank.

The 4th company had moved on to the churchyard, lying on the eastern slope which fell towards Boves. The French holding it retreated to a farm behind the church. With loud hurrahs, the Prussians marched forward, and reached the farm door before the fugitives could shut it. Eighty-one prisoners were here taken.

The 6th company, on reaching the foot of the hill, advanced against a farm lying to the north-east, from which our main attack had been powerfully flanked.

It was opposed by a distinctly more numerous enemy, in a strong

position, and the losses were considerable. The Subaltern in command, quickly coming to a decision, seized the nearest house, in order to have a point of support, and then rushed forward against the farm. After a short hand-to-hand fight, the French 33rd yielded to their "compatriotes," as they called our fusiliers. Some of them escaped by the village street. A non-commissioned officer of the 6th company followed with his zug, and stormed a small farm under a fierce fire. The 6th took 93 prisoners, all belonging to the Dépôt Battalion of the French 33rd. It afterwards seized and held the north-west exit of Boves village. The Brigadier now issued orders for the attack to be continued.

The 5th company, together with the 65th Battalion, held the Ruin hill. The 3rd company was in reserve at the foot. The 8th company was directed to descend to Boves to resume connection with the 30th Brigade, and to search the village. The Subaltern in command halted with a zug at the church, sending another zug, under his junior Officer, towards the Avre bridge against that part of the village known as St. Nicolas. This zug joined the 68th (30th Brigade) in an attack on some French infantry, who fell back on Longueau.

The 8th company made prisoners of those who had fled into Boves.

At the same time, some companies of the 28th (30th Brigade) advancing from the south, on both sides of the railway, arrived in the village. At 3.30 P.M. Boves was cleared of the enemy.

In the village street, in the midst of an excited group of soldiers who were crowding round some prisoners, stood a well-dressed gentleman, who, when he was arrested, gave out that he was an Englishman.

Imbued with the warlike spirit of his nation, he had gone to the top of the church tower in order to witness the battle, forgetting that not only by the French, but also by the Prussians, he would probably be regarded as a spy. The successful result of the conflict saved him from the natural consequence of such suspicion at our hands, and he was able to prove that he was a member of an International Red Cross Society. In an account of his experiences, which he published at a later date in an English newspaper, he paid the fusiliers a compliment on their courage, saying that, "had they worn red coats he would have taken them for Englishmen."

However, to the courage of the fusiliers alone the victory was by no means to be attributed. The 3rd battalion, meanwhile, under superior orders, had moved as far as the Avre, between Boves and Cagny, without meeting any enemy.

The 11th company then crossed to the opposite side of the stream, and pushed on to the place where the Paris Railway crosses the line running from Montdidier to Amiens. In a farm about 300 paces distant was a hostile detachment, who opened a badly aimed fire upon the well-covered Fusiliers. The 12th company came up and prolonged the firing line to the right. As soon as the French perceived this reinforcement they evacuated the farm, which was occupied by the 12th company. The Commanding Officer now gave

orders that no further advance was to be made, and about 4 P.M. the battle came to an end.

The 1st Corps had been engaged at some distance from the 15th Division. The 1st battalion, 28th, and a squadron had been thrust into the gap, so as to protect headquarters.

The weakness of this point escaped the enemy. Towards evening the French retreated, along the whole line, to Amiens. The 16th Division pushed forward as far as the fortifications, but the increasing darkness stayed pursuit.

The rays of the setting sun shining on the Cathedral spire of Amiens made it visible to the troops at Boves. The battle had been won before the very gates of the city. The Commander of our Division addressed a few patriotic words to his men, who responded with a thundering cheer for the King.

The 30th Brigade were detailed to occupy the captured positions.

The 33rd fell back on Sains, where they resumed their packs, and took up the quarters prepared for them. The 5th company remained in Le Cambos Farm. Our loss on this day, considering the success of the engagement, were less than might have been expected. The connected and careful leading of the troops had saved the companies from unnecessary loss. The small list of casualties was regarded by the regiment as honourable in the extreme, for it was a clear proof of orders well considered and precisely followed.

Summary of Losses.

Com- pany.	Dead.			Wounded.			Missing.		
	Officers.	N.C.O.	Men.	Officers.	N.C.O.	Men.	Officers.	N.C.O.	Men.
3	—	—	—	1	—	9	—	—	1
4	—	—	1	—	—	2	—	—	—
5	—	—	4	—	—	15	—	—	—
6	—	—	4	—	1	19	—	—	—
7	—	—	—	—	—	2	—	—	—
8	—	—	—	—	—	4	—	—	—
Total ..	—	—	9	1	1	51	—	—	1

= 1 Officer and 62 men.

The result of the battle was that the enemy was thrown back upon Amiens with a loss of several thousand killed, wounded, and prisoners, and the next day it was found that he had abandoned the city. It was immediately occupied by the 16th Division.

The next move of General v. Manteuffel was, having secured Amiens, to advance against Rouen, the chief objective of the campaign. The 1st and 2nd Companies were detailed to hold Sains.

The farm was occupied. The 7th company took post as escort on the flank of the battery, which now opened fire from a spot north of the farm, against the enemy's very strong position on the hill where stands the ruin of Boves.

The Divisional Commander rode up, and ordered the battalion to advance against the hill. The movement was made in echelon of company columns, the 5th company leading on the right.

The 8th company was now halted by the Divisional Commander, and ordered to occupy the wood lying along the line of retreat, and to protect the other battery which had now advanced to this point. Half a zug was thereupon left in the wood; a zug told off to the guns, and out of the remainder two züge were formed, which followed the movement of the 5th and 6th companies.

When they arrived within range of the French infantry on the Ruin hill, they were greeted by a hail of bullets. Mingled with the clear, ringing, and well-known sound of the Chassepôt, was the louder report of the "Tabatière" rifles, with which the Gardes Mobiles were armed.

In spite of much loss, the two companies, extended, continued their advance, but without being able to fire in return, the range being too great for the needle-gun. When the 5th company had arrived within 700 paces of the enemy, and had found shelter in a ditch, the leader ordered the fire to commence. The 6th company prolonged the line to the left, and the battalion commander sent the remnant of the 8th to do the same upon the right.

Whilst the fight was thus inaugurated by the 2nd battalion, the Brigadier sent the fusilier battalion of the 65th, together with our 3rd and 4th companies, along the hollow road from Sains to Boves.

The objective of the whole force was the ruined castle of Boves, and the two batteries north of the Le Cambos Farm co-operated with accurate fire.

Farre's army, which had retreated in the direction of the northern fortresses, would not, to all appearances, for some time be capable of again taking the field. To search for this army amongst the fortresses was not in accordance with the general idea, which was simply that all danger threatening the army besieging Paris was to be warded off, and that, therefore, any hostile body was to be attacked and destroyed.

There was still a considerable force in Rouen, about 40,000 men, under General Briand, and these troops were only a few days from the German Army investing Paris. Minor enterprises on the part of this contingent had already awakened a suspicion that Briand intended to assume the offensive. It was, therefore, evident that his force must be the objective of the 1st Army.

General v. Goeben, with 6 battalions, 8 squadrons, and 3 batteries was left in charge of Amiens and its citadel.

The westward march of the remainder began on the 29th. On the 2nd December the cavalry came into contact with the enemy's patrols.

The order of march was as follows:—VIIIth Corps, with 30th

Brigade as reserve, by the Amiens-Rouen high road. The 1st Corps, the Bretueil-Rouen road. On the 4th, the advanced guard of the VIIIth Corps drove back the enemy's advanced parties after a brisk skirmish. About this time the troops suffered inconvenience from the cold, and also from deficiency of supplies, owing to the extreme poverty of this part of Normandy.

On the 5th, General Briand evacuated Rouen without attempting to defend it, and the town was occupied by the Germans. The battalions marched through the streets with the bands playing. Very few inhabitants were visible in the indistinct light of the moon and the gas-lamps. The men first became aware of being actually in the town on seeing the beautiful façades of the houses. A halt was made before the Hôtel de Ville. A Commandant had already been appointed, and, with the help of the authorities, had arranged our quarters. The quartering was done by streets.

It was only on the morning of the 6th that this great achievement was rightly understood. Very early the streets were filled with soldiers, gazing in admiration at the beautiful city which had fallen into their hands without a blow. The splendid Gothic edifices, the beautiful Place, and the picturesque streets delighted one and all. Other circumstances, moreover, much contributed to the universal satisfaction. The excellent restaurants on the Quay opened their doors at an early hour. There were soon found all the Officers not on duty, refreshing themselves with oysters and champagne. Seated before well-covered tables, they forgot the privations they had endured. Welcome indeed would have been the announcement of a cessation of hostilities for some days. But the war was not over yet.

The hopes of a little relaxation in Rouen were quickly dissipated. The 1st Corps marched in, and the 15th Division was sent into the suburb across the Seine. Farewell to oysters and champagne! On the 8th the pursuit of the enemy, who had retreated, according to information gained by the patrols of the VIIIth Corps, in the direction of Havre, but in several disjointed columns, was undertaken. For this purpose a number of flying columns were formed, who were to keep up communication with Rouen by means of relays. One of these columns was formed by the 29th Brigade, together with three squadrons of hussars, a light, a heavy, and a horse artillery battery. The order of march was as follows:—

Advanced guard	{	2 Squadrons.
	{	2 Battalions.
	{	1 Light battery.
Main body	.. {	3 Battalions.
	{	2 Batteries.
Left flanking	{	1 Battalion.
detachment	{	1 Squadron.

The whole country was now under deep snow, and a hard frost made the roads very slippery and bad for marching.

The advance on the 8th and 9th met with no opposition, and information was received that the enemy had reached Honfleur. Hussar Officers, who had been sent on to reconnoitre the place, had seen French troops on the coast, and had been fired at.

It was soon evident that Briand had fallen back to the sea in disorder, and that his numbers had been considerably thinned by desertions.

The Officer Commanding our column had already issued his orders for a further advance, and with the hope of a halt by the sea all thoughts of weariness disappeared. But our expectations were not to be realised, for we were immediately recalled to Rouen.

The situation on the Somme had changed. In the fertile provinces of Flanders and Artois, there were many fortresses and dépôts; amongst them Lille, a place of considerable strength. A new French army had been assembled. Not only did the dépôts supply every kind of warlike matériel, but the road to England was short and open, and it is England who supplies all people engaged in war with arms, at least all those who can afford to pay the heavy prices demanded.

To this district, sheltered by the fortresses, had Colonel Farre's troops retreated after their defeat at Amiens. General Faidherbe had also arrived in Lille, now the headquarters of resistance in the north, and had immediately set to work to reorganize the army. His capacity and energy were well known, and he went about his difficult task with speed and judgment. He began by trying to instil discipline into the troops of the 22nd Corps d'Armée. He recruited the battalions at the dépôts with Marines and with Mobiles. Above all, he took care to make his artillery efficient and numerous, by employing the Marine gunners. His force was divided into 3 divisions, each of 8 Line and 6 Mobile Guard battalions, with 18 guns; 2 batteries were retained as reserve. His numbers amounted to more than 30 000 men, with 66 guns, together with an independent detachment of 3,000 men, which was intended to distract the attention of the Germans by daring manœuvres.

Faidherbe was not long in giving the Germans proof that his reputation was genuine. By one or two happy attacks on the reserve of the 1st Army, carried out by detached portions of his force, he gained the confidence of his troops, without which the best General cannot hope to be victorious. And at the same time he drew off the German troops from Havre. He was determined that this important harbour should not fall into the enemy's hands.

On the 12th December, he advanced against the fortress of La Fère, occupied by our troops. His attack failed, but succeeded in drawing the attention of the Germans upon himself, and so prevented the capture of Havre.

Even before the unexpected and energetic movements of the French, under their gallant leader, the 1st Army had been ordered by Von Moltke to hold Rouen, and to watch the left bank of the Seine.

General v. Manteuffel now divided the Army into two groups. The 1st Army Corps, with the Guard Dragoon Brigade, on the Seine; the

VIIIth Corps, and the 3rd Cavalry Division on the Somme, the two being connected by the Amiens-Rouen railway, and in touch with the 5th Cavalry Division at Dreux.

The 29th Brigade returned to Rouen by the shortest road. The march was made under great difficulties, because of the heavy snow, and infantry had to be detailed to assist the guns in descending the hills. The column advanced very slowly, the hussars leading their horses. We reached Rouen on the night of December 11th. The next day the march was continued on Amiens. General v. Manteuffel was anxious to greet the men as they left their quarters, and a march-past before the Hôtel de Ville was ordered; but when the troops moved off from the place of assembly, the ground was so slippery that it was almost impossible to stir. However, General v. Manteuffel, who was still suffering from an injury to his foot, caused by a fall from his horse, made his appearance, supported by a stick, and leaning on the arm of his Adjutant, in order to give the men a morning greeting. Owing to the ice, a regular march-past was impracticable, and we passed before our Commander almost without any order whatever, while he expressed his deep sense of our gallant behaviour during the past few days. The hussars left Rouen on foot. The batteries had to be left behind, for they had to wait until the horses' shoes had been looked to.

At mid-day a thaw set in, and the next day was very wet.

December 14th was a day of rest, and a draft of convalescents and Reservists joined the regiment.

The return of the Germans along the Amiens road was utilized by the French authorities, by means of false reports, to revive the courage of the inhabitants. Impudent notices declared that the French had won great successes, as for instance:—

“Paris bombarded for forty-six hours. Fritz killed at the head of his troops. Bismarck a prisoner with 20,000 Prussians. 80,000 killed, and 190 guns taken.”

“The Mayor of Pontoise informs the people that General Vinoy fought and defeated the Prussians, on December 6th, 7th, and 8th. Their army is retreating. Vinoy is in pursuit. The Prince of Saxony is a prisoner.”

“100,000 men with 600 guns made a sortie from Paris on December 10th. The Army of the Loire has taken 20,000 prisoners, and 10,000 Prussians are dead and wounded. William and Bismarck are surrounded by 150,000 men.”

Again,—“A petroleum bomb killed Prince Fritz. Bismarck is a prisoner. An armistice granted for forty hours. Prussia asks to treat. Trochu demands five millions, and the restoration of our fortresses and cities which have been destroyed. A treaty was concluded yesterday.”

While the VIIIth Corps was marching towards the Somme (the Ist remained at Rouen), Faidherbe was moving on Amiens. This city was held by a detachment under General v. Goeben.

The attack of the French on La Fère had misled General v. Manteuffel. He believed that the enemy was about to turn his attention

to the northern part of the line of investment round Paris, and the information brought in by the patrols led him to conclude that Faidherbe would attempt to advance by Arras, Bapaume, Péronne, and Ham, by the roads leading eastward upon Paris.

Under this supposition, the German troops were ordered to take up the following positions:—

Von Goeben's detachment and 15th Division at Montdidier, in order to operate against the enemy's flank and rear. This concentration was to be effected by the 18th December, and as numbers of franc-tireurs were reported to be in the neighbourhood, the two squadrons of hussars covering the movements were to be supported by a company of the 33rd in vehicles, procured by requisition. This duty was carried out as ordered, except that our men had to march, the vehicles only sufficing to carry the packs. They did three days' march in forty-eight hours.

On the 18th the concentration was completed, and on the same day the French were reported to be retiring from La Fère and Ham behind the Somme.

On the 19th a telegram from the Royal Headquarters announced that Faidherbe had concentrated his force at St. Quentin, on the 16th. The French force had now been recruited up to 62,000 men, and their leader intended to recapture Amiens. He knew it was weakly held, and he sought a strong defensive position north of the city, in order to meet the attack of the VIIIth Corps hurrying back to encounter him. This he found on the left bank of the Hallue, pointing towards Amiens. His left wing rested on the Somme, and detachments extended along the river between Péronne and Corbie. The former, a fortified town, was still in his hands.

The Hallue is from 13 to 18 feet wide. The valley is very narrow, and from Pont Noyelles southward is bordered by a grassy down. The hills on the left bank slope gradually down towards the stream, and extend as far as Amiens.

Faidherbe occupied his selected position on the 19th. His right wing, in Vadencourt, Bavelincourt, Beaucourt and Béhencourt, covered the road Arras-Amiens, and was composed of one division. A second division covered the roads to Albert and Corbie, from Fréchencourt to Becquemont. A division was placed in support at Corbie. Another watched the Somme between Corbie and Bray. The position was prepared for defence. 24-prs. were brought up from Arras. Every Officer received special instructions, and the total force amounted to 45,000 men. The VIIIth Corps, on the other hand, did not number more than 18,000, but it was reinforced by the six squadrons and six guns of the 3rd Cavalry Division, and by the Brigade which had hitherto occupied Amiens.

While the French troops had enjoyed several days of rest, the Prussians had been making very great exertions. The Divisions of the VIIIth Army Corps, especially, had been called upon to carry out a most arduous march,¹ before they reached the position in front

¹ The 33rd Regiment had marched 200 miles, in very severe weather, from November 29th to December 18th.

of Amiens. So excellent and abundant had provisions been in the north of France, that the lack of them in the neighbourhood of Amiens, where there had already been serious fighting, was all the more keenly felt. The villages were all more or less foraged out, and had little left to supply the needs of men and of horses. The clothing of the troops, especially as regards boots, had become very deficient; and there had been no time to remedy this defect, either by mending or replacing, for the country people ordinarily wore wooden shoes; and those of leather, which they kept for Sundays, were utterly unsuited for marching or hard walking, and hardly any could be found large enough for the big feet of the fusiliers. It is therefore not surprising that many of the men were footsore. In order to employ those troops incapable of marching, orders were given on December 19th, that all footsore men, and those no longer fit to march, should be sent on the 21st, to Amiens, under a sufficient number of Officers. By this means a detachment was formed to hold Amiens and the battalions of the 3rd Brigade and the detachment of the 3rd Cavalry Division were set free for service in the field. The Guard Cavalry Brigade, the Guard Hussars, and the 2nd Guard Uhlans were on the march to Amiens by Beauvais, for the further strengthening of the Northern Army.

On December 22nd the VIIIth Army Corps was closely concentrated east of Amiens, and General Manteuffel determined to drive the enemy from his position. A division had been despatched by the King's orders to reinforce him; it was now approaching St. Quentin, and the General resolved to attack the enemy's right wing direct from Amiens, the city being secured by a very small garrison, and by the force already advancing between it and the enemy. General v. Goeben was ordered to move out with the VIIIth Corps and three regiments of the Cavalry Division, by the road leading to the mouth of the Hallue, starting at 8 A.M. on the 23rd. The right wing was to drive the enemy back beyond the Hallue, and to hold him in front, whilst the left wing and cavalry, moving by the road to Acheux, were to turn his right, supposed to be at that place.

The attack was made on the 23rd, the 29th Brigade assembling at 8 A.M. in a hollow north of Cainon, behind a haystack, in order to receive its orders. The day was bright; 8 degrees of frost. The ground was hard frozen, and in the clear atmosphere the enemy's lines on the opposite hills stood out with great distinctness. The 29th Brigade was ordered to move to the left, and advanced into the wood west of Querrieux. The 30th was to follow *en échelon* on the left. They were both to wheel inwards against the enemy's line this side of the Hallue, and were to wait for special orders before they crossed the stream. Two squadrons, two batteries, and a half company of sappers were attached to the division.

The movement began at 9.45 A.M. A squadron and our 1st battalion were ordered to cover the right towards Daours. This battalion took up a position at Croix de Landy, waiting till the brigade reached the same level. The advanced guard of the brigade was composed of a squadron, the 3rd battalion 33rd, and a battery. The

10th and 11th companies moved in line of company columns at considerable interval; the 9th and 12th were in half-battalion in reserve, the whole directed on the Querrieux wood. The hussars reported all the farms and villages on the Hallue as strongly held. The 2nd battalion followed the 3rd, and then came the 65th Regiment and the other battery.

As soon as the companies of the 3rd battalion passed the wood, wheeling inwards, they were fired at by advanced parties near Querrieux.

The 9th company were brought up to fill the gap between the 10th and 11th, but the battalion was quickly brought to a stand, and was assailed by shells from beyond the Hallue.

The two batteries were ordered by the Divisional Commander, General v. Kummer, to open fire from the hills south of the railroad. The two batteries of the 30th Brigade took part on the hills to the north.

It was past 11 o'clock, and the 3rd battalion, 33rd, with one of the 65th in support, was ordered to seize Querrieux.

The orders for the attack were as follows :—

The 9th and 10th companies to seize the western entry into the village. The 11th, supported by the 12th, to force the entry on the road from Allonville. Although there was an open space in front of Querrieux, 1,000 paces broad, it was passed at the double with but little loss, and the village was carried at the first rush. 300 prisoners were taken, and the bridge fell into our hands. The 2nd battalion was immediately ordered up, in order to occupy the village, and to prepare it for defence. This was done with some difficulty under a fierce artillery fire. An observation post was established in the church, in order to watch the progress of the attack of the 30th Brigade on Fréchencourt. A battalion of the 65th took up its position west of the village.

Of the 3rd battalion, the 9th company was to the east of Pont Noyelles towards Albert, supported by the 11th; the 12th company, north of the railroad, on the west of Querrieux, supported by the 10th. The troops turned their attention to making a strong defensive position. The enemy's artillery fire on the village went on without interruption, but without causing any loss. Meanwhile a fierce struggle had broken out on our right, and there our first battalion had become engaged. As soon as it had taken up position at the Croix de Landy Farm, the Commander sent information of his having done so to the Brigadier, and received instructions to continue his advance. The 1st company moved north, the 3rd south, of the Amiens-Daours road. The 3rd and 4th followed. They were fired at by skirmishers, who, on being attacked by a squadron of hussars, drew off, part towards Bussy, and part to Vecquemont. The 1st company pursued the former portion, the 3rd the latter, and his first line became thereby so much extended, that the battalion Commander resolved to reunite the companies before he continued his advance. A battalion of the 65th Regiment was, moreover, moving on Bussy from Querrieux. The battalion Adjutant carried an order

to draw off along the Amiens-Daours road. While this was being done, the Colonel of the King's Hussars brought up two more squadrons, making three in all, and reconnoitred the position of the French about Daours.

The village, with that of Vecquemont, is situated in the angle between the Hallue and the Somme. On the left bank of the Hallue is a commanding ridge, stretching down to Daours, where the enemy had established a long line of artillery. The village with its massive buildings was occupied in force.

The hussar Colonel gave the Commander of our 1st battalion the information he had obtained as to the enemy, and invited him to join him in attacking the position. Captain Menner consented, and declared himself ready to do so as soon as he should have reunited his battalion.

Meanwhile the 8th Jägers came up on the march from Villers-Bretonneux to Querrieux in order to join the 15th Division. The hussar Colonel explained the situation to their Commander, and expressed his opinion of the desirability of the Jägers joining the fusiliers in an attack on Daours. The Jäger Officer was willing, stipulating only that General v. Kummer should be informed of this move.

Our 1st battalion formed for attack. The 1st and 3rd companies formed the first line, moving to the music of the regimental band. Two Jäger companies also advanced, and the houses on the right bank of the Hallue were easily carried.

Captain Menner was just about to bring up the second line into the village, when orders reached him from the Divisional Commander to bring up his battalion, which this Officer thought was still on the Amiens-Daours road, to Bussy. As his 1st and 2nd companies were already engaged, Captain Menner could only comply so far as regards the 2nd and 4th. When he arrived, Bussy had been carried by the 1st battalion, 65th. When this was reported to General v. Kummer he sent orders for the whole to move to Daours. When he had ordered Captain Menner to Bussy, the General was not aware that the attack on Daours had already commenced.

The hussar Colonel had now $4\frac{1}{2}$ battalions and a battery under his orders.

The Germans were now in possession of nearly every point this side of the Hallue, but the orders now received to cross the stream could not be carried out. It was too deep and broad for wading, and, in spite of the intense cold, it was not yet frozen over, and the French still held the bridges.

At 2.30 the French made a strong counter-attack. Long lines of tirailleurs streamed down both sides of the road east of Pont Noyelles. In this important village our 2nd battalion was also posted. The 8th company advanced to meet the 43rd French Regiment moving against the south-east corner of Pont Noyelles. As the numerous gardens obstructed the view and range, the company had to advance along the Daours road to the far side of the enclosures, until they found shelter behind haystacks and in the roadside ditches. As

they moved forward they suffered heavily: their Commander was badly wounded; but, when they halted, their fire checked the enemy, who retreated with great losses.

The 9th, 11th, and 12th companies held the main entry into the village. Here the attack was pressed with greater energy. The supporting *zug* of the 11th company was brought up into the firing line, but the French forced their way into the village, and the struggle was hand to hand. Our people fought with the greatest stubbornness, and found the butts of their rifles the most effective weapon. Two of our Officers were attacked by individual Frenchmen, and were only rescued by the daring of their men.

At length the enemy retreated, and orders reached our Brigadier to attack the ridge with all the troops at his disposal, as soon as the attack of the 30th Brigade should be observed to be making progress. Soon afterwards information was sent from the post of observation on the church tower that two hostile batteries had turned their fire in a more northerly direction. It was therefore inferred that the 30th Brigade was pushing forward, and the Brigadier gave orders for an attack upon the ridge.

The 2nd battalion and 9th company moved out. The road, as far as the crest of the ridge, passed over open ground, rising in regular terraces. The drums beat, and the troops advanced, the five companies in line. At a quick pace the men climbed terrace after terrace, suffering considerable losses. As soon as the enemy became aware of our approach, he crowned the ridge with a closed line of infantry, and poured down volley after volley. Two company leaders were wounded, and our right wing was assailed in flank. But, in spite of all, no halt was made. Only a few volleys were fired at the troops who out-flanked us. The line rushed forward, and the ridge was won. Two guns were captured. Our attack was made before our batteries had discovered what was going on, and just as we reached the crest they fired a few shells, happily without doing us any harm.

However, no time was to be lost. We were in possession of the ridge, but the companies had become much mixed up. This we put straight in about a quarter of an hour, and then a heavy fire broke out against our right, whilst at the same time we were attacked in front by the French 33rd Regiment. Their drums beat the charge, but before it came to hand to hand fighting we were compelled to fall back from the position we had won.

The guns we had captured were wrested from us. For the first time we turned our backs upon the foe.

Our retreat to Pont Noyelles was closely followed up by the French, and our losses would have been infinitely greater had not darkness come to our aid.

Half way down the hill the enemy halted, and appeared to be organizing an attack on Pont Noyelles. The remnant of our 3rd battalion was stationed on the outskirts of the village, and, seeing strong columns advancing to the assault, the sections had drawn close together. They were too few, however, to cover the whole extent of the village border, and no additional forces were available. Two bat-

talions of the 65th were south of the village. Between them and our 3rd battalion was a large gap, and thither the 2nd battalion was led. The Commanding Officer, when we arrived in line, ordered the men to halt, front, and to extend so as to fill the opening. The Daours road, running through a hollow, afforded a convenient shelter.

With remarkable discipline the fusiliers fronted and turned into the hollow. The danger was very great. The enemy was close at hand. Should he succeed in getting into the village, every advantage won that day would be lost. We were called to face the enemy once more with renewed energy and self-sacrifice. The order was passed along the lines that those who still had cartridges should use them, and that those who had none should be supplied by those who had: but that no shot should be fired until the enemy was close upon us. By this time it was quite dark. "Do not fire" was the word which passed along the line from mouth to mouth. The men were as still as hunters waiting for their game. Dark forms moved before us. "Are you French?" cried a few simpletons. A few shots cracked, but the fire was quickly silenced, for the belief spread that they were our own men in front. The uncertainty was painful. Then there was a sound of strange bugles; dark masses became visible, and commands given in French were heard. The enemy was advancing to the attack. Our line blazed with fire. A fight at close quarters followed, raging, if possible, most fiercely on the Albert road, where the 10th, 11th, and 12th companies were stationed. Our fire was too much for the enemy. They turned, leaving behind them dead and wounded, and we rejoiced in our revenge. But we had dearly paid for our success.

Just at the moment when the last cartridges were fired, two battalions of the 4th Regiment from the Reserve reached the spot. They were too late to do more than witness the enemy's defeat.

As the duty of holding the outskirts of the village had been committed to the 30th Brigade, our battalions were able to withdraw and re-form. When the companies had assembled, a fresh supply of ammunition was distributed. This was done under the light cast by some houses which were on fire: The 2nd and 3rd battalions took up alarm quarters in Querrieux.

The 1st battalion had remained from early in the afternoon in the same position, for the French, in spite of many efforts, were unable to recapture Daours.

The 1st, 2nd, and 3rd companies late in the evening went into alarm quarters at Bussy, and the 4th company furnished the outposts between Bussy and Daours. During the night one of our patrols set fire to a haystack, behind which a French battalion was lying asleep without a single sentry.

The loss of the regiment on this day was as follows:—

	Officers.	N.C.O.	Fusiliers.
Killed	—	5	56
Wounded	11	11	179
Missing.....	—	—	3
	—	—	—
Total..	11	16	238

Com- pany.	Dead.			Wounded.			Missing.		
	Officers.	N.C.O.	Men.	Officers.	N.C.O.	Men.	Officers.	N.C.O.	Men.
1	—	—	2	1	—	5	—	—	—
2	—	—	—	—	—	1	—	—	—
3	—	—	1	—	—	1	—	—	—
4	—	—	—	—	—	—	—	—	—
5	—	—	7	—	—	14	—	—	—
6	—	—	1	2	—	20	—	—	—
7	—	1	7	2	3	23	—	—	—
8	—	2	9	2	2	29	—	1	—
9	—	—	9	2	2	19	—	1	—
10	—	1	4	—	2	18	—	—	—
11	—	1	7	2	1	25	—	—	—
12	—	—	9	—	1	24	—	1	—
Total..	—	5	56	11	11	179	—	3	—

Many of the men had bayonet wounds.

The companies assembled in the streets of the village as soon as the first streaks of dawn showed themselves on December 24; the scene was lighted by the many houses still burning, which cast everywhere a ruddy glow.

The cold was more intense than on the previous day, and was more keenly felt, owing to the want of sufficient rest and food.

As it was expected that the struggle would be continued, attention was turned, first of all, to the supply of ammunition and to the condition of the arms.

The darkness had brought to a close the fight of the previous day. The villages which we had won were still in our hands. Our troops were at the foot of the ridge of hills, which were still held by the French. The bloody nature of the struggle proved that only by great sacrifices could their position be carried. Before all, a clear idea of the position and intention of the enemy was absolutely necessary. But for this full daylight was needed.

At 2.30 A.M. General v. Kummer issued orders for the 15th Division to hold its ground and to form up for the defence of the position we now occupied.

About 8 A.M. the troops were at the posts, expecting the attack to be renewed, but the enemy remained quiet, his batteries alone

opening fire on the villages in which we were stationed. The shells, although bursting close to our lines, caused us no losses.

Up to mid-day there was no change in the aspect of affairs. It was intensely cold, with a keen north wind, and the men were, as far as possible, posted in the houses.

The enemy's movements were carefully watched and reported, and before long it became evident that he was retreating under cover of a strong rear-guard. At 5 P.M. we occupied the ridge he had now finally evacuated. The 2nd and 3rd battalions then marched to Allonville, whilst the 1st took up quarters in Bussy.

It was Christmas Eve when the fusiliers, happy, but tired and hungry, entered the houses, where the unwilling hosts reluctantly received their uninvited guests. At home the Christmas trees were glittering with lights. We remembered our loved ones, who at this moment, probably, were thinking of those missing on this Christmas night, fighting far away on French soil for their country, and hearing only the thunder of battle. It was a strange way of keeping the festival, and yet we had our gift too, and that was the glorious consciousness of duty well done. All the wounded were taken to Amiens, and attended to in the hospital. To a few was given a beautiful Christmas gift. General v. Manteuffel had a thought for those who had fought so bravely on the Hallue, and presented the bravest of them with the Iron Cross. Major v. Woedell and eight fusiliers received the decoration from his hands.

On the morning of the 25th, the VIIIth Corps was ordered to pursue the enemy. The 29th Brigade moved along the Amiens road, and, after a march of 25 miles, in the teeth of an icy-cold north wind, suffering much from hunger, we reached our halting place.

The next day we had easy work, searching the villages within a radius of 4 miles for arms; this, a good supply of rations, and some hours rest and warmth, was a well-earned reward after the exertions of the past few days.

The enemy had withdrawn to the shelter of his fortresses, and to pursue him thither did not come within the scope of the campaign.

On the 27th our troops laid siege to Péronne. The 15th Division was detailed to cover the besiegers from Arras, and took up a position about Bapaume. The village was held by the 30th Brigade, the 29th was ordered to deploy behind the Péronne road.

Several days of rest followed. Our only duty was to keep up communication with the troops round Péronne and with the cavalry brigade. This was done by means of strong patrols, as there were many franc-tireurs in the neighbourhood.

On New Year's Eve all the Officers assembled in the summer-house of a deserted château. They had procured all the ingredients required for a punch-bowl, but not for pancakes. In order to replace these essential delicacies, a fusilier, who in time of peace had been a pastrycook, made them a cake.

Those present took their places at a neatly-laid table. The hall was furnished with every comfort, which the occupants had left for the strangers who were to see the New Year in their home.

But the feast was not riotous. Each tried in vain to wake up a cheerful spirit amongst his comrades. They had met together willingly, because none cared to stay alone in their quarters, and mixing with others gave a feeling of home; but when they sat together in that melancholy room, their thoughts turned involuntarily homewards, where at that hour they would be so sorely missed. The hours passed slowly. At last the final moment of 1870 approached. They all filled their glasses. Lieutenant-Colonel v. Henning raised his, and asked those present to drink to those who had given their lives in the war. Every face was grave. The next toast was for the King, the beloved Commander-in-Chief, for whom they would all have gladly died. The toast was accompanied by a loud and hearty "Hoch!" The third toast was for the dear ones at home. With much emotion the Commander spoke of the many families whose hearts would be filled with thoughts of those who were fighting for them far away. Deeply moved, the company listened to his words, which were suddenly interrupted by the solemn tones of the chorale "Jesus meine Zuversicht." The regimental band was stationed at the door of the hall, ready to greet the New Year with the strains of music. The Officers went out of the hall into the garden. Can we ever forget the scene? The stars shone brilliantly in the clear sky of the winter night, the ground was glistening white, a strong contrast to the dark heavens. In the distance, near Péronne, some houses were burning, casting a lurid light all round. At intervals the shells fired by the besieged or the besieger flashed through the air, accompanied by a dull thunder, which echoed far around. In the distance death and devastation, and here the solemn keeping of the feast. Barheaded each one listened to the tones of the glorious hymn, quite oblivious of the bitter north wind.

It was a moment of deep feeling, a landmark in the lives of each of those who stood there. Each one felt the exaltation of the moment, without being conscious of the cause. The silence was broken by the joyful greeting, "A Happy New Year!" and hands were warmly clasped. Then the company separated, each to their own quarters. Early the next day the companies assembled at the place of alarm, to receive the instructions for the New Year.

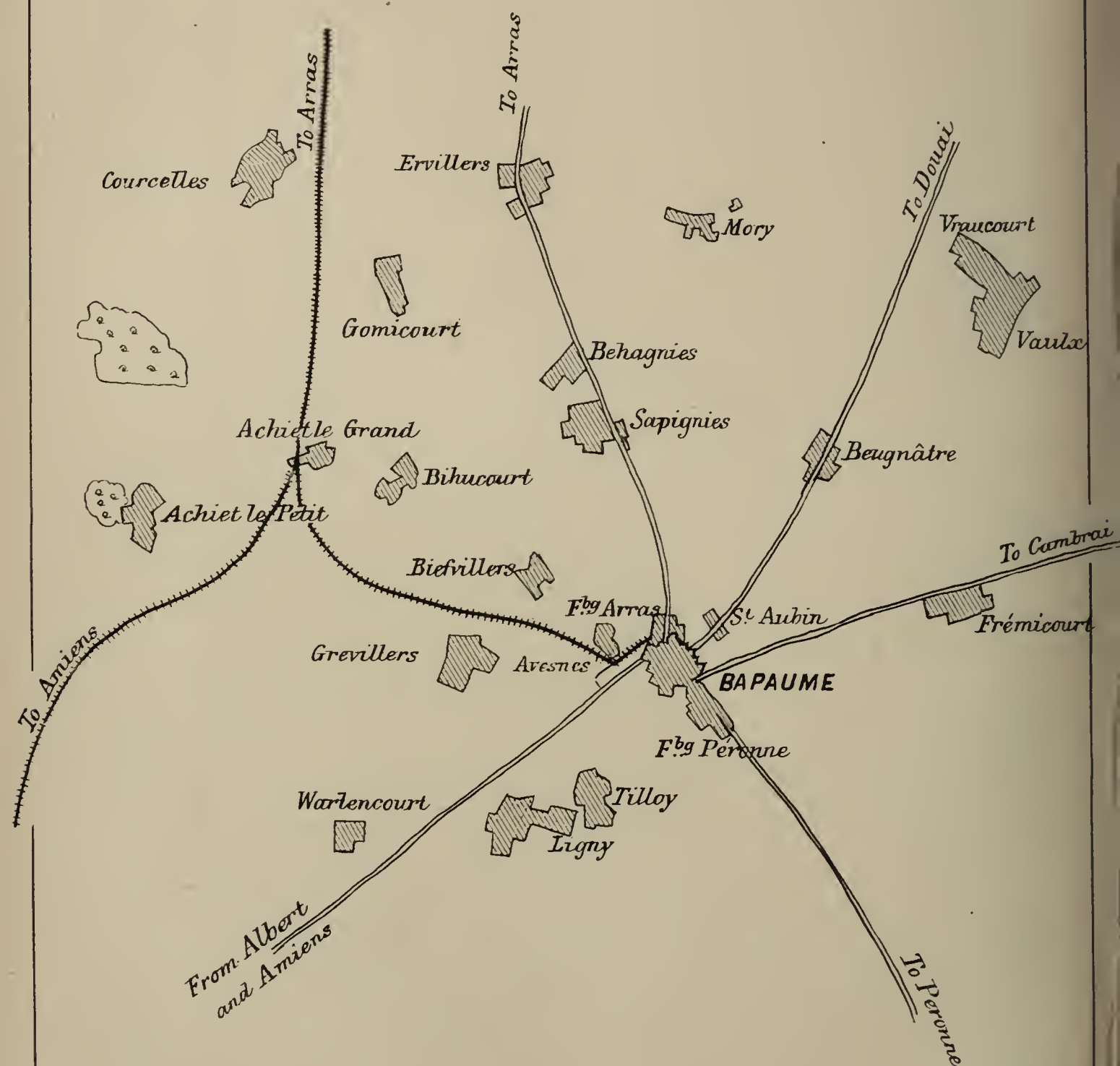
Information had been received which pointed to the fact that the enemy was again about to assume the offensive, and that Faïdherbe intended to attempt the relief of Péronne.

The 3rd Cavalry Division, the Guard Dragoon Brigade, the 32nd Brigade, and the 15th Division, were the only German troops available to move against him. Our ranks were thinned by death and sickness, and the battalions mustered no more than 500 bayonets. If the French advanced, it would be with renewed strength, both in numbers and matériel. We were ordered to concentrate closely round Bapaume on the afternoon of January 1.

General Faïdherbe had assembled 35,000 men and 90 guns at Arras. He held all the places south of the town between the roads to Doullens and Cambrai.

On the 2nd of January he marched to relieve Péronne.

BATTLE OF BAPAUME.



Scale

0 500 1000 2000 3000 4000 5000 paces

The 15th Division (eleven battalions only), with four squadrons and four batteries, were in the centre of the advanced line of the 1st Army above the Somme, in and about Bapaume. General v. Goeben, with the 8th Jägers and two horse artillery batteries, had his headquarters at Combles. On the right of the 15th Division was the Guard Dragoon Brigade, stationed at Fins, and towards Combray, supported by our 3rd battalion and a horse artillery battery. The 40th Regiment, the 9th Hussars, and two batteries of the 16th Division, were on the march to join this detachment.

At Achiet-le-Grand were two companies of the 23th Regiment, with a troop of hussars and two 16-prs., covering the railway and maintaining connection with the 3rd Cavalry Division.

Shortly after mid-day the enemy's approach was reported, and during the afternoon the German advanced posts in front of Bapaume, held by the 30th Brigade, were fiercely attacked.

After four hours' fighting against greatly superior numbers, the defenders were outflanked, and drew back to Beugnâtre and Favreuil.

During this engagement our 2nd battalion was ordered up to Bapaume, and occupied the villages of Avesnes, Biefvillers, and Grévillers, lying west and north-west. The 1st battalion was retained in Bapaume.

During the night our outposts extended from Grévillers to Frémicourt.

Bapaume and Biefvillers were the key of the German position in the battle of January 3; of these, the former is the largest. It is a small town of about 3,000 inhabitants. Most of the old fortifications had been levelled; but to the west, an old earthen bastion was intact, and the moat was still to be seen. The country round is undulating, and, as a rule, quite open, but there are many convenient hollows, terraces, and ravines. Although the view is extensive, there is much cover, and there can be no question that the enemy was favoured by the ground.

The night passed quietly, but at 6 A.M. information was sent in from the picquets of our 2nd battalion that the enemy was evidently preparing to move forward from Achiet-le-Grand and Bihucourt. The cold was great. The ground was covered with snow, which impeded the movements of the artillery and cavalry. Nevertheless, our hussars rode out cheerily towards the enemy as soon as the grey day broke, and brought back information which confirmed the intelligence sent in by our picquets. The enemy was drawing up his troops for battle, apparently deploying his main strength between Behagnies and Bihucourt, with strong columns at Mory and Vaulx.

Our 5th company was at Biefvillers, not 2,000 yards from the enemy's line, and when the Captain Commanding saw himself threatened by greatly superior numbers, he reported that he was unable to defend the whole extent of the village without reinforcement.

The battalion Commander had only one company with him as reserve, and he sent word that the 5th company was to do its best.

The French were set in motion at 8 A.M. Biefvillers was menaced by

a division. The 1st battalion, 33rd, was now sent up to Avesnes and there deployed for the defence of the village. The 6th, 7th, and 8th companies were already there.

Simultaneously with the arrival of the 1st battalion in Avesnes came a message from the 5th company that Biefvillers was being attacked in force and could be held no longer. In fact, the Captain Commanding had already evacuated the village, and had fallen back to a hollow between the Avesnes road and the railway.

Biefvillers was immediately occupied by two and a half French battalions.

When General v. Kummer heard of this withdrawal, he ordered our regimental Commander, Colonel v. Henning, to retake the village at once, as it was the very key of the position.

Meanwhile one of our batteries had taken post east of Avesnes and opened fire on Biefvillers. The 1st battalion and the 5th company were detailed to carry out the counter-attack. The 8th company was ordered to occupy the hollow now held by the 5th company, and to remain there in support.

The 1st company led the advance. The 2nd and 3rd were in second line. The 4th in reserve. The 5th had already moved forward again, and had occupied the hollow road close to the village.

The south-east corner was selected as the objective of the 1st battalion, and the line of advance was by a ravine at the foot of one of the hills on which Biefvillers stands, so as to gain some shelter from the enemy's fire.

The instructions for attack were as follows:—The companies were to approach as near as they could under cover to the point of attack, then detaching a strong firing line, move to the left, and, without firing a shot and with a loud hurrah, to rush upon the corner of the village. That taken, they were to extend along the borders, strengthen their position, and then attempt to reach and hold the northern border. For the right wing of the 1st company, a battery in action on the road east of Biefvillers was told off as the object of attack.

Whilst the company leaders of the 1st battalion were making arrangements for carrying out the work entrusted to them, the 5th company tried to reach the south-west corner of the village by the hollow road. The defile was deep in snow, which impeded all movement, but it seemed as if the enemy had only a few troops in the place. Suddenly, just as the Officer Commanding was about to order a rush across the open, heavy volleys struck the company both in front and on the left flank. This fire was terribly destructive. The Captain fell, mortally wounded, and, under command of a sergeant, the men attempted to regain the shelter of the hollow road. The perilous position of the 5th company did not escape the leader of our 1st battalion, and he sent forward his reserve company (the 4th) to attract the attention of the enemy. The Subaltern in charge was struck by several balls, and fell dying in front of his men. The sergeant-major took his place, and the company reached the crest of the hill east of the village. A zug, under a sergeant, managed to

approach within 50 paces of the hostile battery unobserved, and compelled it to limber up and retire.

A portion of the 4th company, with a few men of the 5th, actually succeeded in penetrating into the village at the south-west corner, but the French had already brought up reinforcements, and drove the Germans out again. The 4th and 5th companies now fell back on Avesnes, but the enemy's pursuit was checked by the 8th company.

Meanwhile, the other three companies had advanced against the south-east corner of the village with very little loss. The 1st and 2nd formed the fighting line; the 3rd remained in the ravine.

The fighting line fixed bayonets, deployed to the left, sent out two *züge* in extended order, and then, the remainder following in close order at short distance, rushed with cheers and drums beating on the village.

The French wavered and fell back to the northern border before this sudden advance, but a portion of them stood firm, and many of the fusiliers fell in this victorious onset.

To fill the gap between these two successful companies and the 4th, when on the point of again advancing against the opposite corner the 3rd company was ordered up by the battalion Commander to seize the southern border of the village. The Captain left a *zug* in the ravine, and with the other two clambered up through the snow, which was in places knee deep, gained the top of the hill, and, in spite of heavy fire, crossed a hedge, and carried the position. He and two of his Officers were either killed or badly wounded.

The men of the 3rd company now joined the 2nd company, and, over hedges, through gardens, and by barricaded paths, broke into the village, and, despite the heavy fire of the enemy, attacked them in the houses hand to hand.

The Officer Commanding our 1st battalion ordered a large farm to be occupied as a rallying point, and sent back to Avesnes for reinforcements.

Five companies of the 33rd had kept three French Brigades at bay for a whole hour, but fresh troops came up, and at length we were compelled to retire on Avesnes and Bapaume. A few men of the regiment could not keep up and were captured. The battalion Commander, rallying some of the fusiliers, threw himself into a hollow filled with snow, on the east side of the road, and, in conjunction with the 8th company posted on the other side of the track, checked the pursuit.

The 6th company which, on the approach of vastly superior forces, had been compelled to fall back from Gréville, had come into line on the left of the 8th; but mistaking the retiring detachments of the 1st for his own—the 2nd—battalion, the Subaltern in charge almost immediately withdrew his men to Bapaume, and occupied a portion of the old fortifications.

The enemy now began to issue from Biefvillers to attack Bapaume. But our batteries, posted on either side of the village, had first to be silenced, and their well-aimed shells caused heavy losses in his battalions.

Heedless of the hostile artillery fire, the gunners directed their whole attention to the French infantry, and prevented their advancing in mass.

An attack on Avesnes, well prepared by artillery, was checked by the fire of those companies of the 33rd who had retreated thither from Biefvillers. The French withdrew, and there was a short pause in the battle—very fortunately for the fusiliers, for ammunition had run out, and the rifle barrels were so hot that they had to be cooled with snow.

The 1st battalion, or rather as much of it as could be assembled, was now led to Bapaume by its Commander. It consisted of 3 Officers and 322 men. Having drawn a supply of cartridges from the ammunition wagons, it occupied the old moat west of the town, in connection with the 6th company.

General v. Kummer now resolved to draw together his scanty force, and to confine himself to a determined defence of Bapaume. Arrangements for a stubborn resistance were made by the half company of sappers. The barricades which had partially been made on the previous day were strengthened, and the windows of the houses on the outskirts were blocked with mattresses, &c. The remains of the old fortifications gave but little protection, and the frozen soil prevented digging.

Avesnes was soon afterwards given up by our troops, although it was full of wounded, and our 5th, 7th, and 8th companies joined the little garrison of Bapaume.

The enemy made two vigorous attempts to carry the western border of Bapaume, but were repulsed. Nevertheless they had managed to sieze Tilloy, Avesnes, Favreuil, and the Faubourg Arras, and it looked as if they were about to make a concentrated attack on the village from the two former localities. It was 3 o'clock. The position of the 15th Division was a critical one; there was much work before it ere darkness fell. Another attack on the old moat had just been repulsed, when suddenly a loud hurrah rang over the battle-field. General v. Goeben had arrived. The welcome they gave him proved the attachment of the men to their gallant leader; in truth, they had far more confidence in him than in any other. His coming put heart and hope into the troops, and inspired them with the certainty of victory.

As soon as he made himself acquainted with the position of affairs, he gave orders that Bapaume should be held at all costs, and as soon as reinforcements arrived that Tilloy and Ligny should be retaken. With the true Commander's spirit, v. Goeben would not give up his reserve, even when he saw the weakness of the Bapaume position and the condition of the troops holding it.

Just as night fell, Tilloy and Ligny were retaken, and the enemy drew off, leaving a large number of prisoners in the hands of the Germans. The ground south of Bapaume was now cleared of the enemy, and the French had gained little except that they were in possession of the places which we had abandoned. General Faidherbe had failed to relieve Péronne. The siege still went on, and the result of the battle was therefore much in our favour.

The 33rd had lost 12 Officers, 18 non-commissioned officers, and 203 fusiliers.

Com- pany.	Dead.			Wounded.			Missing.		
	Officers.	Sub- Officers.	Men.	Officers.	Sub- Officers.	Men.	Officers.	Sub- Officers.	Men.
1	2	1	11	—	1	13	—	3	8
2	1	1	19	3	4	44	—	1	3
3	2	1	11	1	3	24	—	—	4
4	1	—	14	—	—	14	—	—	8
5	1	—	4	—	2	8	—	—	3
6	—	—	1	—	—	—	—	—	—
7	—	—	—	—	—	1	—	—	—
8	—	—	1	1	1	12	—	—	—
Total..	7	3	61	5	11	116	—	4	26

The 3rd battalion had no losses to complain of.

During the night following the engagement, General v. Goeben had to decide whether or no he would continue the struggle on the ground he now occupied. He took into consideration the extreme exhaustion of the troops, the deficiency of artillery ammunition, and determined to fall back behind the Somme, leaving the 3rd Cavalry Division and two batteries in touch with the enemy.

Early on January 4th our companies assembled in order to march off to the brigade rendezvous. Those of the 1st battalion were mere relics of what they had been. A fresh distribution of Officers was made. The march to the Somme began at 7 A.M., and crossing by the bridge at Feuillières, below Péronne, we found quarters at Flaucourt and Barleux.

After the exertions of the past few days we were looking forward to a period of rest. But it had not come yet. Our quarters were at the foot of the height on which our siege batteries were established. Their guns kept up a constant fire, enough to disturb the soundest sleep, and every now and then shells fired from Péronne burst in Barleux. Four men of the 1st and three of the 2nd battalion were thus wounded.

The next day it was discovered that the French had again fallen back upon their fortresses; but as it was reported that Faidherbe had been reinforced by another Corps d'Armée, and it was certain that he would make another attempt to relieve Péronne, General v. Goeben resolved to take up a position threatening the right flank of his advance from Arras. The 15th Division was, therefore, ordered to occupy Albert and Bray.

The 33rd, with a squadron and a battery, marched to Albert on January 6. For the next few days the French remained inactive, and a telegram of Faidherbe's on the night of the action round

Bapaume explains why he could not take advantage of his favourable strategic position. "We have a very large number of wounded. The troops have had no hot meal for two days. They have eaten nothing but bread, and this was frozen. They have had no proper rations like the Germans, who always carry supplies with them. They have only the barest necessities in the way of clothing, and during the last two days the weather has been very severe." In a word, the French Army was unable to prepare for fresh efforts so quickly as our own.

On January 9 arrived a draft of convalescents and Reservists, and on the same day, intelligence was sent in by the cavalry that the French seemed about to advance once more.

On the 10th, we heard that Péronne had capitulated, and at 6 A.M. our 2nd battalion marched to Bapaume, in order to support the 3rd Cavalry Division. On their arrival the 7th and 8th companies were immediately detailed for outpost duty; the 7th holding the villages of Beugnâtre, Frémicourt, and Favreuil; the 8th Sapignies and Bihucourt. Troops of the 5th and 14th Uhlans were already in possession of the villages, and our companies, sharing the picquet work by day, did the whole of it by night.

On the 11th the French advanced in great force against Bapaume, drove in our outposts, with heavy loss to our 6th company and to the 5th Uhlans, and induced the cavalry Commander to fall back upon Le Sars, and eventually behind the Encrebach.

Péronne having fallen, a great change had come over the situation. Our force available for defensive operations was doubled, and General v. Goeben was placed in command of the 1st Army.

The first thing our new Commander-in-Chief did was to order the cavalry to advance again past Mesnil, and to combine with a strong detachment of infantry that he was sending on to Albert.

This movement gave our 2nd battalion, which was still attached to the cavalry division, a great deal of harassing duty. During the day long marches had to be made in bitter cold, and during the night our companies were all on picquet whilst the troopers slept in cantonments.

The next few days were passed by both armies in reconnoitring and manœuvring. Our superior cavalry gave us a great advantage. The enemy was unable to conceal his movements, and so General Faidherbe, despite well-planned and well-executed marches, was unable to out-manœuvre us.

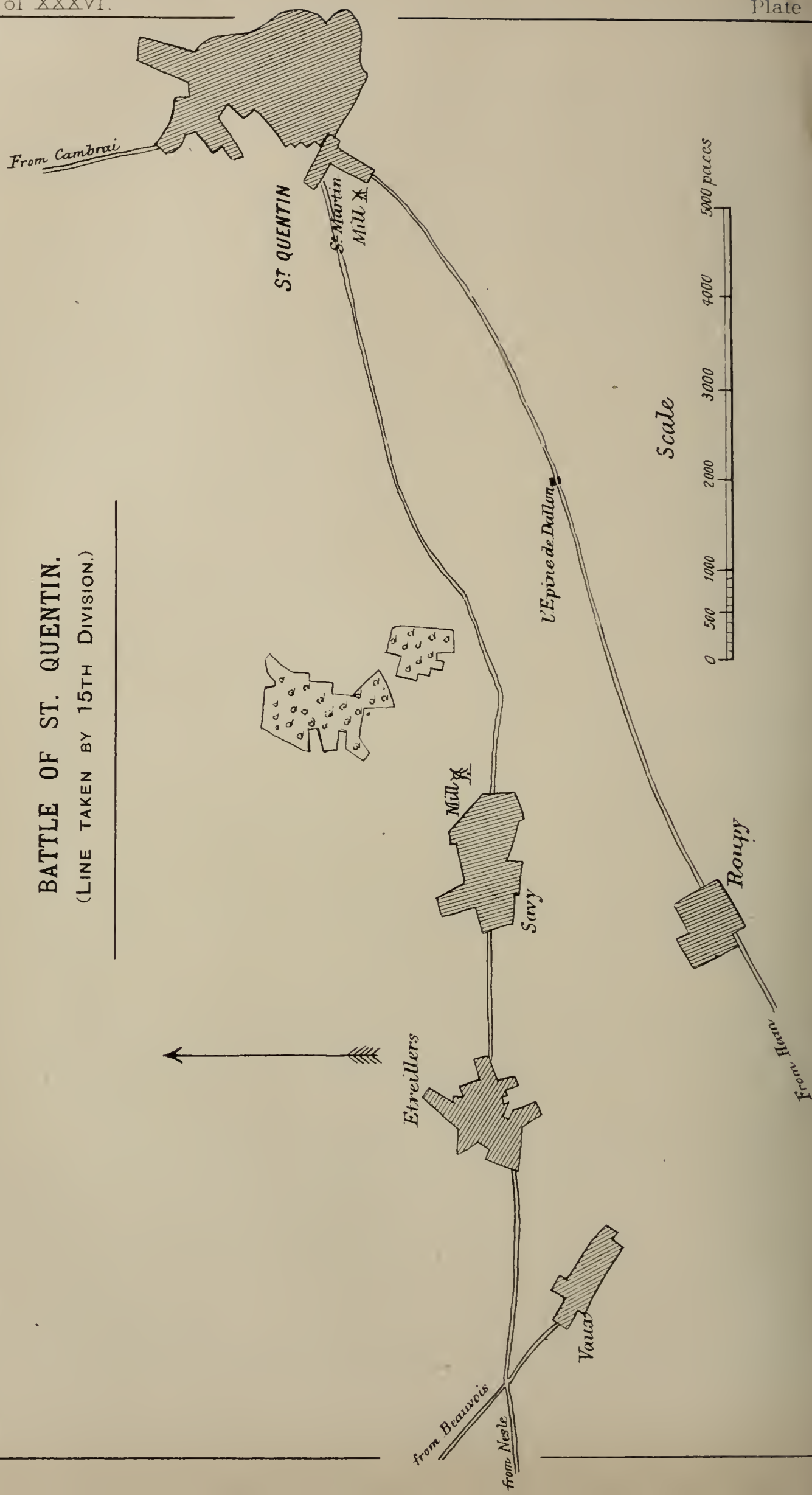
The French General had now established his headquarters in Albert, which we had relinquished, and there he issued orders for an advance in the direction of St. Quentin. He had reinforced his army to the utmost in his power, and it now numbered 71 battalions and 100 guns, but was almost entirely deficient in cavalry.

Von Goeben had at his disposal 48 squadrons, $38\frac{1}{2}$ battalions, and 162 guns.

On January 16 the French reached the neighbourhood of Vermand and St. Quentin.

Von Goeben resolved to concentrate all available troops upon the

BATTLE OF ST. QUENTIN.
(LINE TAKEN BY 15TH DIVISION.)



Somme. He made Nesle his headquarters, and under the impression that the enemy was marching east, as they actually were, ordered the 15th Division to move towards St. Quentin, crossing the river near Misery, and to ascertain whether the French had halted in the neighbourhood of St. Quentin or were continuing their movement.

The 3rd Cavalry Division was to take part in the operation, reconnoitring and covering the left as far as the Schelde.

The 29th Brigade moved out by the road past Athies towards Tentry, the 30th Brigade marching in the same direction from Brie.

The hussar patrols soon brought in information that the enemy was advancing towards Beauvois and Caulaincourt. Two squadrons and two batteries held the French in check. In the engagement which ensued, and which resulted in Beauvais, Caulaincourt, and Vermand being occupied by the Germans, the 33rd (1st and 3rd battalions) was in reserve. We lost only three men.

Faidherbe now resolved to accept battle at St. Quentin, and v. Goeben was equally determined to attack.

The 15th Division was ordered to advance the next morning up the road from Vermand and Etreillers, to attack and carry St. Quentin, while the 3rd Cavalry Division and the infantry attached to it were to extend to the left, as far as the road to Cambrai, and cut off the retreat of the French in that direction.

At 8 A.M. on the morning of the 19th, the 15th Division was drawn up in the following order, the head at the cross roads between Beauvois and Vaux.

Advanced Guard	{	2 squadrons, 7th Hussars.
		2nd Battalion, 65th Regiment.
	{	A light battery.
		Fusilier Battalion, 65th Regiment.
Main body ..	{	A heavy battery.
		1st and 3rd Battalions, 33rd Regiment.
		2 batteries.
		30th Brigade.
		2 squadrons.

There was a dense Scotch mist, and, owing to the wet, it was impossible to march anywhere but on the main roads.

Savy was passed by the advanced guard at 11 A.M. So far we had met with no opposition, although we had been fired at by artillery.

To the east of the village the ground rises gradually towards St. Quentin.

The Savy wood stretches away north of the road, and to the north-east rises a hill which shuts in the view. On this hill was stationed a French infantry brigade, under General Isnard, who, immediately an advanced guard was observed, occupied the wood.

Our cavalry had driven in the enemy's patrols, and the battery of the advanced guard took post by the windmill, 500 paces north-east of Savy, opening fire on the enemy's artillery.

Here our two battalions were also ordered to take up their position,

and, very shortly afterwards, our Commander, Colonel v. Henning, was wounded in the foot by the splinter of a shell. The two heavy batteries were now brought up to the same spot.

The 65th Regiment had by this time penetrated the wood lying nearest Savy, but the French made a fierce resistance, and our 1st battalion was ordered to support, moving by the road from Savy to St. Quentin.

The 1st and 2nd companies deployed in a dip in the ground, and the former, moving half left north of the road, became briskly engaged on the high ground beyond. The enemy's skirmishers were advancing, and their flanking fire from the Farm l'Epine de Dallon was annoying in the extreme. The 2nd company had borne off to the right, and the 4th was sent forward to fill the gap; the 3rd remaining in the dip in reserve.

The enemy continued to press forward, and our 3rd Battalion was now brought up to take part in the fighting. Seeing that the French infantry in the Farm l'Epine de Dallon completely enfiladed our line, the Officer Commanding directed the 11th company to capture this important post.

About 2 p.m., the 15th Division was in rather a critical situation. We had penetrated both portions of the Savy wood, but the French counter-attack was being pressed most energetically, and our ammunition was giving out.

The larger portion of the wood was retaken by the enemy, and the position occupied by the 33rd was outflanked on the left. The 3rd company was therefore called up to this quarter of the field, and, reinforced by some of the 65th Regiment, managed to check the enemy and drive them back.

The regimental Commander now ordered up the 10th and 12th companies to reinforce the 1st battalion; more batteries were brought up; a strong detachment, the 8th Jägers and a battalion of the 28th Regiment, advanced by the high road, and, in conjunction with the 11th company of the 33rd, carried the Farm l'Epine de Dallon.

Isnard's Brigade began to give ground, and General v. Kummer ordered a general advance upon St. Quentin. From valley to valley we pressed victoriously forward. Our losses were heavy, and the enemy's shells did great execution, especially in the 10th and 11th companies of the 33rd, but at about 4 p.m. we were close to the Faubourg St. Martin, where the enemy, who had been reinforced, seemed inclined to make a stand. Our troops rushed on, with drums beating and trumpets sounding, heedless of their rapidly thinning ranks. There was no halt. The colour of our 3rd Battalion was seen in front. Once it fell; the bearer was struck down, but, seized by a fusilier, once again it fluttered in the van of the fight. Darkness was falling, but still the battle went on. Our 3rd battalion, with two companies of the 1st, entered the Faubourg, and one of the most brilliant incidents of the day was the storming of a mill, fiercely defended, by the 3rd company.

Our last battle had been fought. Faidherbe was in full retreat on Cambrai.

The regiment lost 3 Officers and 108 men.

General v. Goeben's pursuit was a vigorous one. The troops were ordered to march 23 miles a day, and the packs of the infantry were to be carried in waggon.

The next day the 15th Division (our 2nd battalion being left in St. Quentin) advanced, at 7.15 A.M., on Cambrai. The continuous thaw that had set in made the roads very heavy; the men's boots were not in good condition, and we only marched $15\frac{1}{2}$ miles. Hence the results of the pursuit were not so great as were expected; our superiority in cavalry produced no marked advantage, and Faidherbe's retreat was most skilfully conducted. He managed to reach his cordon of fortresses without molestation.

Von Goeben, on heading off the pursuit, ordered the 15th Division to the district round Bapaume, and the 33rd, once more re-united, was soon sent back to Amiens.

On the 29th of January came the announcement of the Convention of Versailles, and the war was practically at an end.

Throughout the campaign the regiment lost 22 Officers, 29 non-commissioned officers, and 381 fusiliers, and 28 Officers, 71 non-commissioned officers, and 773 fusiliers were wounded.

LIST OF THE ARMY REGULATIONS AND INSTRUCTIONS IN FORCE ON THE 1ST JANUARY, 1892.

	Promulgated by		
	Army Circular, Army Order, or General Order.	Clause or num- ber.	Year.
Academy, Royal Military, Regulations	A.O.	98	1891
* Allowance Regulations	A.O.	210	1891
Army Circulars :—			
Up to 31st December, 1882, reprint	A.O.	252	1889
From 1st January, 1883, to 31st December, 1887.			
Army Orders, from the 1st January, 1888. ..			
† Army Service Corps, Drills and Exercises, Book of	A.O.	192	1891
† „ „ „ Duties, Regulations.. ..	A.O.	420	1889
„ „ „ Manual for Field Service	A.O.	399	1889
† „ „ „ Standing Orders	A.O.	378	1890
† Artillery Company, Honourable, Regulations for	A.O.	170	1889
† „ „ Field, Drill	A.O.	128	1889
„ „ „ Garrison, Drill, Vol. II.	A.O.	52	1891
„ „ „ Manual .. .. .	..	..	1887
„ „ „ Manual for Field Service	A.O.	14	1889
„ „ „ Siege, Manual	A.C.	76	1891
† „ „ „ Standing Orders	A.O.	474	1889
Asylum, Royal Military, Standing Orders.. ..	..	..	1874
Barrack Furniture, Schedules	A.O.	90	1889
Bearer Companies and Field Hospitals, Manual for Field Service	A.O.	481	1888
Canteens, &c., Rules for	A.O.	435	1889
Cavalry Drill, Vol. I. (provisional edition) ..	A.O.	259	1891
„ „ „ Vol. II.	A.O.	9	1892
„ „ „ Manual for Field Service	A.O.	481	1888
† „ „ „ Regulations for the Instruction and Movements of	G.O.	107	1887

* Annual edition.

† Under revision.

	Promulgated by		
	Army Circular, Army Order, or General Order.	Clause or num- ber.	Year.
Channel Islands Militia, Regulations	A.O.	132	1890
Chaplains, Instructions for Guidance in Ministration to the Troops	A.O.	239	1890
Civilian Subordinates, Travelling Expenses, &c. ..	A.C.	185	1887
Clothing and Free Kit, Rates of Compensation for ..	A.O.	51	1889
„ and Necessaries, Prices of, Regular Army and Militia..	A.O.	80	1891
„ „ „ Volunteers ..	A.O.	132	1891
„ „ Rates for Making-up, &c.	A.O.	27	1890
„ „ Rates for Marking ..	A.O.	238	1890
„ Regulations	A.C.	176	1887
*College, Royal Military, Regulations	A.O.	181	1889
Commissions in the Regular Forces for University Candidates ..	A.O.	197	1891
„ „ „ for Officers of Militia ..	A.O.	256	1891
„ „ „ for Officers of Colonial Local Military Forces.	A.O.	10	1892
*Correspondence, Registration of, in Military Offices	A.O.	135	1891
*Cyclist, Infantry Section, Drill of.. ..	A.O.	115	1890
Dress Regulations	A.O.	81	1891
Drum and Flute Duty, Infantry .. ..	..	..	1887
Encampments, Regulations	A.O.	53	1890
*Engineer Regulations	A.O.	332	1889
Equipment Regulations	A.O. {	234 & 363	1890
		236	1891
Examination in Range-finding, Royal Artillery ..	A.O.	133	1889
Explosives, Instructions for Classification and Stowage for Sea Transport	A.O.	218	1891
Fares by Steamboats	A.O.	382	1890
Field Army Establishments (Home Defence) ..	A.O.	252	1890
„ „ (Service Abroad) ..	A.O.	180	1891
Field Engineering, Manual	A.O.	269	1889
Field Service, Manuals :—			
Army Service Corps	A.O.	399	1889
Artillery, Royal	A.O.	14	1889

* Under revision.

	Promulgated by		
	Army Circular, Army Order, or General Order.	Clause or num- ber.	Year.
Field Service Manuals :—			
Cavalry	} A.O.	481	1888
Infantry			
Medical Staff Bearer Companies and Field Hospitals			
Mounted Infantry			
Post Office Corps	A.O.	14	1889
Provost-Marshals and Military Police	A.O.	481	1888
Signallers	A.O.	230	1889
*Financial Instructions	A.O.	481	1888
Forms and Books, Army	A.C.	105	1886
General Orders, up to the 31st December, 1887.	A.O.	299	1889
Guncotton, Destruction and Disablement of Guns by	A.O.		
*Honourable Artillery Company Regulations	A.C.	137	1886
Hospital Equipment, Schedules	A.O.	170	1889
Income Duty Regulations	A.O.	292	1889
Indian Staff Corps, Admission to	A.C.	234	1884
*Infantry Drill	A.O.	82	1891
„ Manual for Field Service	A.O.	317	1890
Lines of Communication, Organization of, and Supply of Stores to an Army in the Field	A.O.	481	1888
Magazine Regulations	A.O.		
„ Rifle (Musketry Regulations)	A.O.	376	1890
„ „ Manual of Rifle Exercises for the Magic Lanterns, Supply of, &c.	A.C.	48	1887
Medical Regulations. Part I.	A.O.	47	1890
* „ „ „ II. (Manual for the Medical Staff Corps)	A.O.	48	1890
„ Staff, Regulations for Admission to	A.O.	162	1891
„ „ Manual for Field Service, Bearer Companies and Field Hospitals.. .. .	A.O.	98	1890
Military Law, Manual of	A.O.	296	1889
„ „ and Procedure, Notes on	A.O.	242	1891
Militia, Medical Staff Corps, Memorandum of Instructions	A.O.	481	1888
† „ Regulations	A.O.	52	1888
„ Reserve, Mobilization and Demobilization	A.O.	336	1890
	A.O.	223	1891
	A.O.	157	1891
	A.C.	13	1887

* Under revision.

† Annual edition.

	Promulgated by		
	Army Circular Army Order, or General Order.	Clause or num- ber.	Year.
Mounted Infantry, Manual for Field Service and Regulations	A.O.	15	1889
*Musketry Regulations	G.O.	92	1887
Nursing Sisters, Regulations for	A.O.	113	1888
*Ordnance Artificers, Regulations	A.O.	458	1889
* „ Machinery, Appointment of Inspectors of	G.O.	119	1886
„ Store Regulations	A.O.	62	1890
Pack Animals, Instructions for Saddling and Loading	A.O.	13	1889
† Pay and Promotion Warrant	A.O.	92	1891
* Paymasters, Instructions for the Guidance of	A.O.	168	1890
Post Office Corps, Manual for Field Service	A.O.	481	1888
Prisons, Military, Rules	A.C.	184	1880
„ Provost, Rules	G.O.	111	1883
Prizes for Skill-at-Arms, Royal Artillery, Instructions for Competition	A.O.	65	1891
Provost-Marshals and Military Police, Manual for Field Service	A.O.	230	1889
* Queen's Regulations	A.O.	433	1889
* Railways in War, Regulations for the working of .. .. .	..	..	1888
„ Military, Manual of	A.O.	130	1889
Railway Trucks, Mounting Guns on	A.O.	334	1889
Range Finding, Examination in, Royal Artillery	A.O.	133	1889
Recruiting Regulations	A.O.	434	1889
Recruits, Schedule of Age, &c., for	A.O.	66	1889
Regimental Debts Act, Regulations under	A.C.	99	1881
* Reserve, 1st Class Army, Regulations	A.O.	88	1889
* Rifle and Carbine, Manual of Exercises, and Bayonet Exercise	G.O.	67	1885
Savings Banks, Military, Regulations	A.C.	41	1883
Schools, Army, Regulations	A.O.	200	1891
Signallers, Manual for Field Service	A.O.	481	1888
* Signalling, Manual of Instruction in	A.O.	201	1891
Single Stick Drill.			
Skill-at-Arms, Prizes for, Royal Artillery, Instructions for Competition	A.O.	65	1891

* Under revision.

† Annual edition.

	Promulgated by		
	Army Circular, Army Order, or General Order.	Clause or num- ber.	Year.
Snider Carbine, Artillery, Manual and Firing Exercises	A.O.	292	1890
Staff College Regulations	A.O.	374	1890
Steamboat, Conveyance of Troops by, List of Fares	A.O.	382	1890
Stores, Supply of, to an Army in the Field (Abroad), and Organization of the Lines of Communication	A.O.	376	1890
Stores, Vocabulary of	A.C.	40	1886
Submarine Mining and Telegraph Stores and Apparatus, Instructions to C.R.E.	A.O.	116	1889
Submarine Mining, Regulations for Course of Instruction in	A.O.	158	1891
Submarine Mining Service in India, Regulations for Non-commissioned Officers, R.E., employed on	A.O.	394	1890
Submarine Mining Vessels, Machinery and Boilers	A.O.	338	1890
Sword and Carbine Sword-bayonet Exercises ..	A.O.	16	1892
*Trumpet and Bugle Sounds	A.O.	245	1888
Valise Equipment (Original Pattern), Instructions for Fitting	G.O.	55	1885
Valise Equipment (1882 Pattern), Instructions for Fitting	A.O.	313	1890
Valise Equipment (1888 Pattern), Instructions for Fitting	A.O.	227	1891
*Veterinary Regulations	A.C.	237	1882
„ Department, Admission to, &c. ..	A.O.	265	1891
†Volunteer Regulations	A.C.	159	1891
Yeomanry Cavalry Regulations	A.O.	298	1889

* Under revision.

† Annual edition.

NOTICES OF BOOKS.

Rulers of India. Edited by Sir W. W. HUNTER, K.C.S.I. *Earl Canning*, by Sir H. E. CUNNINGHAM, K.C.I.E. Oxford: Clarendon Press, 1891. Pp. 215. Size $7\frac{1}{2}'' \times 5\frac{1}{4}'' \times \frac{3}{4}''$. Weight under 1 lb. Price 2s. 6d.

“Already the haze of distance has settled on the events of the Mutiny. The din of battle grows faint, the cannon’s roar, the crash of the charge, the shouts of victory, the sobs, the groans; faint, too, the clatter of angry tongues, the shrill dispute, the eager blame, the storm of faction fight which raged so high and shrill. We look at the men, at the events of that time, through a calmer atmosphere and with steadier eyes. We can read their meaning and gauge their worth. We think of them with reverence, with gratitude, with just and patriotic pride. Their names are familiar words to us, and will be, it may be hoped, to generations of Englishmen yet unborn. Their greatness is our own—a precious national possession. Amid much in modern life that is vulgar, ignoble, and commonplace, the achievements of our countrymen in the Mutiny shine out distinct. They were on an heroic scale; nor least heroic the serene and resolute mind, the unshaken nerve, the firm justice, the loftiness of soul, with which Canning, rising nobly to the duties of a foremost post in an eventful epoch, piloted his country’s fortunes in that dark hour across that tempest-driven sea.” Sir H. Cunningham has in this admirably-written little work given full and sufficient reason why we should, as he says, think of the men of the time of the Mutiny “with reverence, with gratitude, with just and patriotic pride.”

Coomassie and Magdala. By HENRY M. STANLEY. New edition. London: Sampson Low. 1891. Pp. 402. Size $7\frac{1}{2}'' \times 5'' \times 1\frac{1}{4}''$. Weight under 1 lb. 6 ozs. Price 3s. 6d.

This is a republication of Mr. Stanley’s volume originally published in 1879, when that gentleman was acting as special correspondent to the New York Herald.

Historical Record of Medals and Honorary Distinctions conferred on the British Navy, Army, and Auxiliary Forces, from the Earliest Periods. By GEORGE TANCRED, late Captain Royal Scots Greys. London: Spink. 1891. Pp. 483. Size $10\frac{1}{2}'' \times 8\frac{1}{2}'' \times 2''$. Weight under 4 lbs. 6 ozs. Price 21s.

This is undoubtedly the best work on war medals which has yet been published, containing, as it does, the history of how they were won, the authority for their grant, and, in many cases, the names of the recipients. It is well illustrated with plates and woodcuts, many of which are of medals of quite exceptional rarity, and will be found an excellent guide by all who take an interest in the history of the Services; to the collector it will be invaluable.

In this work is also a chapter on the Order of St. John of Jerusalem, which will be interesting to the many Officers of the Army who belong to that Order.

It has but two defects: the more common medals are not illustrated, and the reader is continually annoyed by references to a certain private collection, of which the catalogue is, moreover, permitted to occupy seventy-six pages.—N. W.

Sir Walter Raleigh. By W. STEBBING. Clarendon Press, Oxford: 1891. Pp. 413, including index. Size $8\frac{1}{2}'' \times 6''$. Boards. Weight $27\frac{1}{2}$ ozs. Price 10s. 6d.

Here is a life of "Raleigh the witch," the "scourge of Spain," the "soldier, sailor, scholar, courtier, orator, historian," the "dare-devil trooper of Languedoc and Munster," the "duellist," and withal a verse writer of limited brilliancy.

Mr. Stebbing has compiled, from the score or more lives of this extraordinary man, a book which, well written as it may be, throws, however, no fresh light on the career of one who had tested the highest pinnacles of success and sounded the lowest depths of misfortune.

The Virgin Queen had her name and his transplanted to the new World: Raleigh's Virginia extended from Martha's Vineyard far south to the Carolinas of Florida, and the man who had hewn the early steps for the great Western nation of our day was executed by King James I, on a vindictive sentence, from which he had long been reprieved.

The book gives us a portrait of its hero, copied from the beautiful miniature at Belvoir.—X.

Dark Days in Chile. An Account of the Revolution of 1891. By MAURICE H. HERVEY, Special Correspondent of the "Times." London: Edward Arnold. 1891-92. Pp. 331. Size $9'' \times 8\frac{1}{4}'' \times 1\frac{1}{2}''$. Weight under 2 lbs. Price 16s.

Mr. Hervey has given an account of Chile politics from the anti-nitrate-party point of view, but it by no means follows it is incorrect, and it is certainly worth reading. Evidently the "Times" was placed in a position of considerable difficulty by the complete divergence of views which existed between its special correspondent and those gentlemen who were nearer home, and represented the Insurgent side. The brief telegrams which passed between the "Times" and Mr. Hervey are certainly terse and to the point. Mr. Hervey leaves us in tantalizing doubt as to the ultimate result of the production of the documentary evidence with which he returned to England. Whether Mr. Hervey was "got at" by the Balmaceda party and made the innocent vehicle of partizanship, or on the other hand was really impartial in his reports, remains too difficult a matter to be decided upon now. Anyhow he gives us a useful "other side of the question."

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ADMIRAL SIR R. VESEY HAMILTON, K.C.B., President, Royal Naval College. Greenwich, in the Chair.

AN ATTEMPT TO ESTIMATE THE PROBABLE INFLUENCE OF THE INTRODUCTION OF Q.F. GUNS ON NAVAL TACTICS AND CONSTRUCTION.

By Rear-Admiral S. LONG.

THE subject which, by the wish of the Council of this Institution, I am to bring before you to-day is one of great importance to all navies, and especially to our own. The enterprise and skill of Lord Armstrong and Co., emulated by numerous other firms on the Continent, have resulted in the production on a large scale of powerful guns with a rapidity of fire at least five-fold as great as that obtainable from guns of such calibre only five years ago.

The 4·7-inch and 6-inch Q.F. guns, to which I allude more especially, are probably familiar to all who had the opportunity of visiting the magnificent Armstrong gallery of the Royal Naval Exhibition of 1891, but a comparative table is exhibited for convenience. Guns of this type will now form an important feature in the armament of even the heaviest battle-ship, while they will constitute probably the main armament of most cruisers.

Such a marked increase in the rapidity of fire is likely, in the opinion of many Officers, to have more influence on sea fights than the increased power of the guns which has been so marked a feature in all navies since the Crimean War, and which was described by Captain A. Noble, C.B., F.R.S., in his address to the British Association at Leeds in 1890, which may be found in "Engineering" of September 12 and 19, 1890, from which I quote the following:—

"A trial has also been recently made between two cruisers, the one armed with ordinary breech-loading, the other with quick-firing, artillery, from which it appears that, when firing at a target, the

latter in a given time was able to discharge about six times the quantity of ammunition fired by the former.

"I need not impress upon you the significance of these facts, or the importance of quick-firing armaments, especially if firing shell, possibly charged with high explosives, against the unarmoured portions of cruisers or other vessels."

Naval Officers will readily acknowledge the truth of this statement when the large area of unarmoured structure to be found even in armour-clad vessels is considered.

While on the subject of Elswick, I will quote a very interesting statement contained in the work "Modern Naval Artillery," published as a guide to the Armstrong exhibit at the Royal Naval Exhibition, showing the advantages of Q.F. guns against torpedo-boats:—

"One of the principal reasons which has led to so large an employment of Q.F. guns in the naval services is, no doubt, the necessity of being able to cope instantly and effectually with the attack of torpedo-boats. The very high speed possessed by the modern torpedo-boat, while increasing its powers of offence, has, at the same time, diminished the risk of its being hit. It not only remains a much shorter time exposed to fire when making its attack, but its rapid motion necessitates a great alteration of aim between each round fired at it, and a corresponding likelihood of error. Suppose a torpedo-boat to be sighted at a distance of 1,700 yards by a war-vessel having a broadside armament of three Service 5-inch B.L. guns, each capable of firing two rounds a minute; the torpedo-boat could not hope to discharge a torpedo with much certainty at a longer range than 400 yards, and would therefore have to traverse a distance of 1,300 yards under fire before she could begin the attack. Assuming the speed of the first class torpedo-boat to be 20 knots an hour, the time occupied in traversing 1,300 yards would be, roughly speaking, two minutes. The war-vessel, therefore, armed with a broadside of three 5-inch guns, each firing two rounds per minute, would be able to discharge twelve shots at the torpedo-boat before there was a chance of her being torpedoed. If, however, in lieu of the three Service 5-inch guns, she were armed with three of the improved Armstrong 4.7-inch 45-prs., she could in the same time fire no less than seventy-two shots, each gun being capable of firing twelve shots a minute. Besides the obvious advantage of being able to fire six times as often, and have six times as good a chance of hitting, there is the collateral one of a very slight alteration of aim being required in the one case, and a very considerable one in the other. Between each round of the 5-inch breech-loading gun the torpedo-boat would move 340 yards, and the aim would have to be correspondingly altered, while between the rounds of the Q.F. 45-pr. gun she would only move 50 yards, and a very slight alteration would be required, and a successful shot would be instantly repeated." "Rapidity of fire must under most circumstances be considered as a very important element in war, but it is recognized by most artillerists that a rate of about ten rounds a minute is sufficient for all guns larger than the 6-pr.

Any quicker rate is liable to be obtained at the cost of impaired efficiency in other directions, and carelessness on the part of the crew in loading and aiming will probably be developed." "Smaller Q.F. guns than the 4·7-inch have been introduced recently, firing shots of 25, 20, 12, and 10 lbs. respectively, and the 25-pr. with a calibre of 3·75 inches is specially suited for the armament of torpedo-boat catchers. A good many of these guns have been made, and they possess a muzzle velocity of 2,200 feet with ordinary powder, and can fire from twelve to fifteen rounds per minute." "It is found that three times the weight of the cordite charge is necessary when powder is used."

It may be remarked that rapidity of fire is more important at sea, where moving bodies are concerned, than on land, the power to repeat a shot instantly before the vessels have much changed their position being likely to produce much more effective firing.

From the same volume the record of Series D of the Silloth experiments with the 6-inch Q.F. gun, which took place on October 8, 1890, is extracted. It is remarked that smoke of a reddish-brown colour was given off by the cordite, but this was so transparent that it would never have interfered with laying the gun; moreover, it rapidly disappeared in spite of the absence of wind.

Series D.—Five rounds with 15 lbs. cordite, and common shell, weight 100 lbs., for rapidity at 900 yards target.

One trial round was fired to obtain elevation, and the firing was then carried on, with the following results, the total time being only fifty-five seconds:—The first four rounds hit the target, the fifth being 5 yards short; the casks supporting the target flag were entirely destroyed and the flag perforated.

The opinion expressed by Major G. S. Clarke, R.E., in his work on "Fortification," is interesting. After stating that armour was originally introduced as a protection against shell, and reviewing the various types of vessels found in our own and foreign navies, with respect to their powers of attack against guns posted on shore, he remarks:—

"To attempt to pierce the armour of the 'Dandolo' and 'Duilio,' or of our 'Inflexible' class, would be a pure waste of ammunition, considering that any of these vessels might be put out of action in half an hour by well-handled medium guns."

The present Director of Naval Construction, Mr. W. H. White, C.B., F.R.S., has also expressed the opinion at the Institute of Naval Architects that it is possible an action between armoured ships might be decided without the armour being pierced, and more to the same effect will be found in "Modern Naval Artillery."

There is no finality in invention, but naval Officers are bound to endeavour to forecast correctly the effect on tactics of each change in naval weapons, of which the present generation have seen so many.

It appears certain that the increased rapidity of fire will render tactics afloat more important, for the subjection of an inferior force to the fire of a superior one, even for a short period, will have at least five-fold significance.

In looking back for guidance as to the changes of opinion on naval tactics which have taken place during the last twenty years, I must acknowledge my indebtedness to the numerous members of this Institution who have written and spoken on this subject, as well as to those Officers who have published books and pamphlets upon it. In these studies we can only follow up trains of thought suggested by others, and no claim is here made for originality.

On comparing the views set forth in 1880 with those indicated in 1886, we are at once struck with the influence the torpedo has exercised in modifying the conception of a sea fight therein exhibited. At the former period the ram held a paramount place as the arm whose effective use constituted the tactical object even during the first phase of an engagement.

At the latter date the torpedo is admitted to be some counterpoise to the ram, and the possibility of an artillery duel constituting the first phase of an engagement between fleets is contemplated.

The progress of gunnery and torpedo equipment during the last five years has certainly strengthened the arguments in favour of the latter view, and the anticipated introduction of smokeless powder will greatly lessen, if not altogether remove, the impediments to manœuvring resulting from the smoke of guns. It, therefore, appears probable that we may look for a more unrestrained use of artillery in future naval actions, and that the intimate connection, to use the words of the late General Sir Howard Douglas, between the Service practice of gunnery and naval tactics will be universally acknowledged.

When the powerful gun armament, and the large amount of displacement devoted to armoured protection in modern battle-ships is considered, as well as the fact that the displacement devoted to armour is of no avail against the explosion of a torpedo, it would appear that full advantage should be taken of these features in her equipment before staking everything on the hazard of a torpedo at close range.

While, therefore, the ram, which at one time appeared undisputed arbiter of naval tactics, from the first appearance of impending battle, continues to hold its place as perhaps the most important weapon, seeing that it utilizes a larger portion of the displacement than any other, and retains its efficiency, so long as the ship floats with motive and directive power intact, it does not appear probable that the efforts of antagonists will, during the first phase of a naval engagement, be devoted to its use, though doubtless it will become an important factor in the ultimate decision of the contest.

On this point Vice-Admiral Bourgois, of the French Navy, writing some thirteen years ago, said: "The return to the ancient methods of fighting with artillery from a distance and on the broadside can only be conceived in the case of two hostile squadrons equally disinclined to risk being struck by the torpedoes of their respective adversaries.

"But the more and more pronounced superiority of artillery over armour plates, in close actions, the only ones of a decisive character, would expose the fighting ships to serious dangers, almost as formid-

FIG. 1.

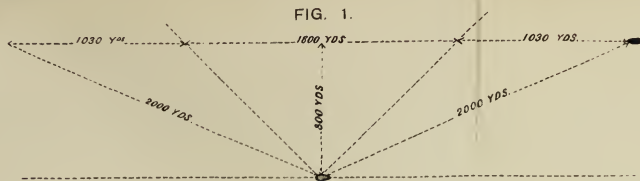


FIG. 3.
POSITION OF SUPPORT.

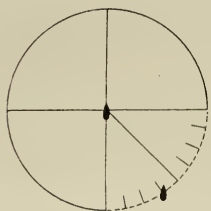


FIG. 2. TWO PIEMONTES.

SPEED 20.5 KNOTS.

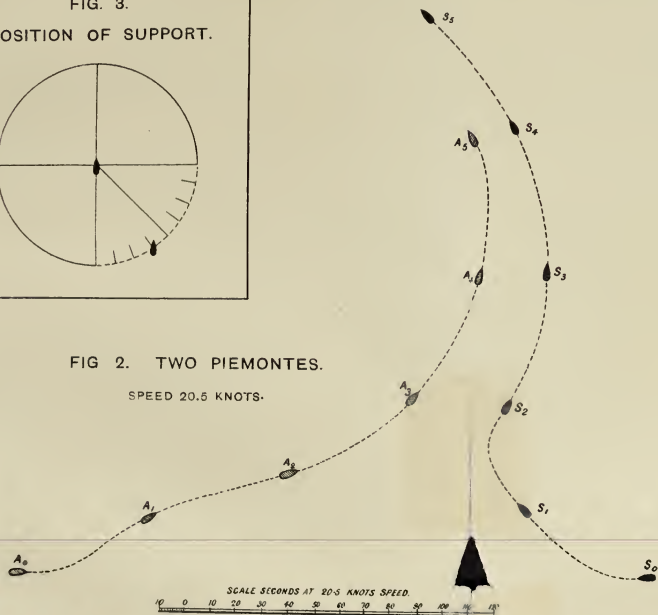


FIG. 4.

FLEET ON VOYAGE

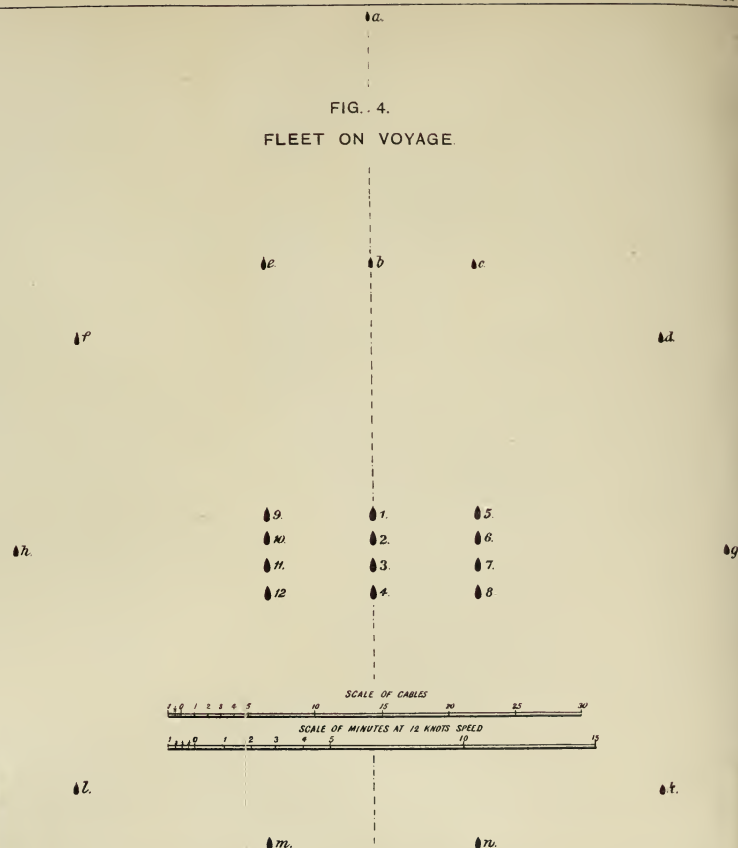


FIG. 5.

FLEET IN ORDER OF BATTLE.

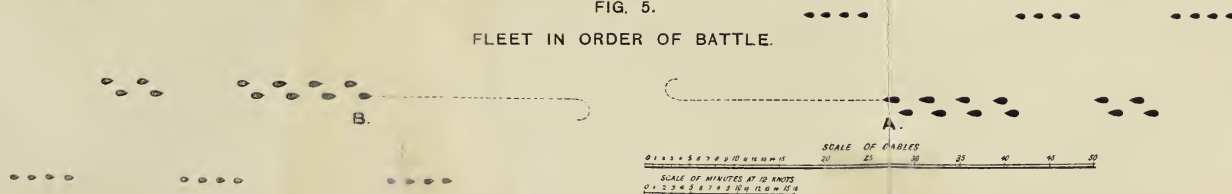


FIG. 1.

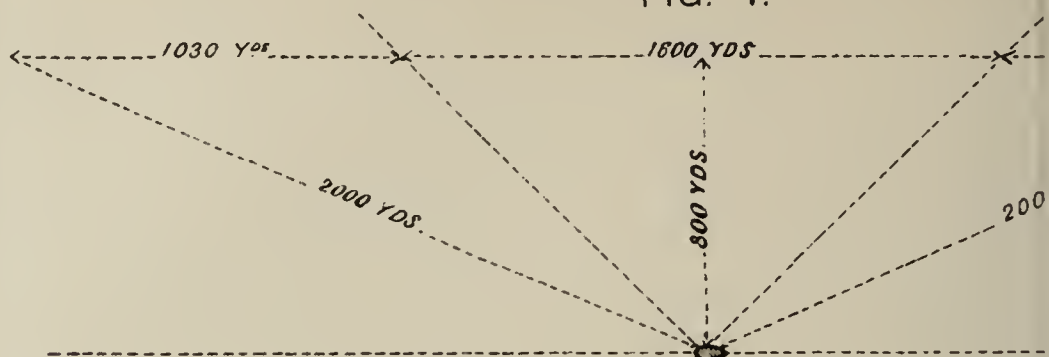


FIG. 3.

POSITION OF SUPPORT.

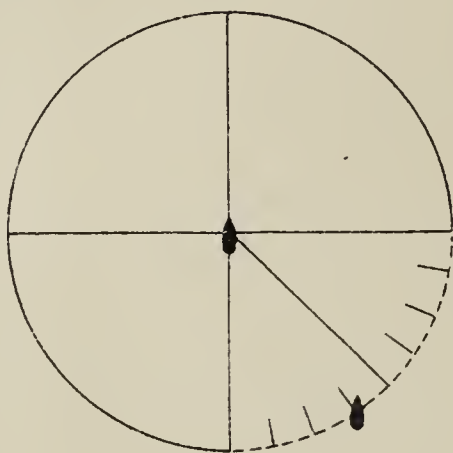
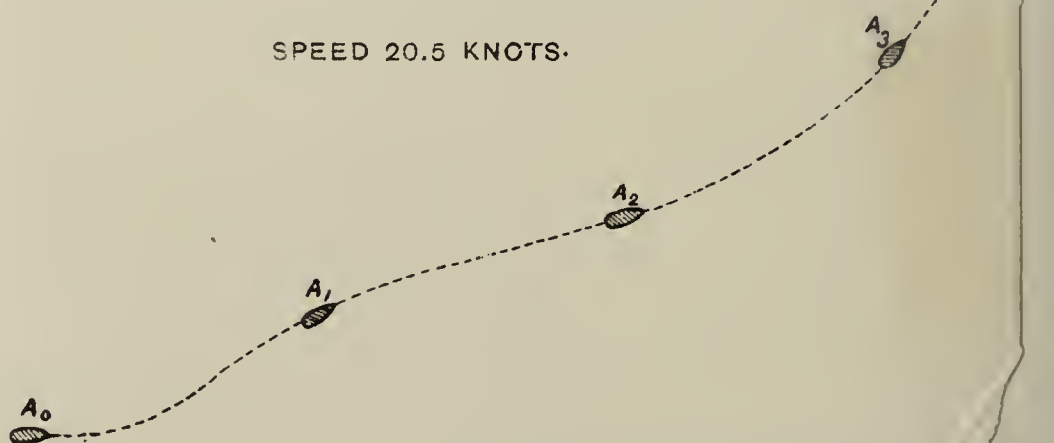
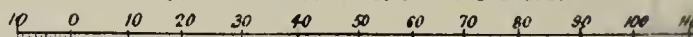


FIG. 2. TWO PIEMONTES.

SPEED 20.5 KNOTS.



SCALE SECONDS AT 20.5 KNOTS SPEED.



B.



able as those presented by torpedoes, if they should not present their plated sides obliquely to the impact of projectiles.

“Against this oblique fire the armoured side still offers a protection it would be rash to disdain. The skill of the manoeuvrer, when the ram blow shall be denied to him by torpedoes, should be directed to avoid presenting his broadside to the direct or normal impact of his adversary’s projectiles, while at the same delivering his own with direct impact on the enemy’s side.

“This double object is too different from that formerly held in view by wooden steam vessels to permit of any reversion to the manoeuvres suited to squadrons of such vessels.”

Admiral Bourgois’s prescience will probably be acknowledged, and I shall assume in what follows that an artillery duel will form the first phase of a naval engagement, the object being to engage beyond effective torpedo range, until the enemy’s battery is much reduced in power, and his exposed torpedo discharges rendered useless.

It is necessary then to assume some distance as a limit to the effective range of the gun and torpedo, as well as to define approximately the limit within which the approach of a ram must influence movements. In view of the serious effect of high-angle fire-practice against decks, distant shots may under special circumstances be resorted to, but the decisive events of an action will probably take place at ranges under 2,000 yards, at which distance the remaining velocities of the 6-inch and 4·7-inch projectiles are about 1,630 f.s. and 1,440 f.s. respectively.

While recognizing the great influence the state of the sea would exert in any particular case, and the advantage conferred upon the combatant possessing the larger and steadier vessels, I shall in the present paper consider gun-fire efficient at sea up to 2,000 and torpedo-fire up to 600 yards.

As regards the ram, if we assume that one ship will in most cases be able to turn herself parallel with another in two minutes, and that two minutes turned into space traversed at 16 knots speed per hour is 1,080 yards, we see that the ram may become an influential factor in a ship’s movements when vessels are yet beyond what has been described as effective torpedo range.

The other feature governing the use of artillery is the effect of the projectiles on impact. From this point of view the presentation of the armoured broadside parallel to that of an enemy abeam is to be avoided, as his shot or shell striking normally would have a maximum penetration.

The large arcs of fire now given to broadside guns will frequently enable an enemy suitably placed to be struck normally to his armour, while the vessel firing occupies an oblique position.

It may be assumed that projectiles of ordinary form whose path makes a less angle with the surface of an armour plate than 45° will not penetrate.

Thus an enemy occupying a position in the sectors extending four points each side of a vessel’s bow and stern would be unable to penetrate her side if armoured along the broadside portion.

In a battle between armour-plated ships of the same date of construction, it would on this ground be useless to discharge the heavy armour-piercing guns until the target aimed at presented a suitable angle.

If a vessel armoured sufficiently to keep out shell were engaged with another destitute of such defence, the latter would be at a great disadvantage, as while one would be vulnerable from all points of the compass the other would have, with respect to her armoured parts only, an arc of impunity of no less than 16 points.

It will be observed (Diagram 1) that if two vessels on opposite courses are so situated as to pass each other abeam at a distance of 800 yards, they would be within 2,000 yards of each other for more than 1,000 yards distance before presenting a direct target to each other. In many cases of actions between single ships and of ships engaging forts, there would probably be an advantage open to one opponent by maintaining the position as much as possible in which he presented an oblique target to his enemy, and this especially at the beginning of an action, when all guns are intact and fire a maximum.

In a single-ship action superior speed would be an important factor in enabling its possessor to select his own position, but in elaborating any system of tactics based on speed, it must not be forgotten that in any but the smoothest waters speed means spray, which on the weather side may very easily amount to a serious impediment to effective gun-practice, and it may be predicted that the weather gauge if two ships were steering the same course at a high speed would constitute an important advantage, as the lee guns could be fought with much greater rapidity and precision than the weather ones.

Such illustrations of practical naval warfare as are afforded by the history of the last thirty years were brought before us last year by Mr. Laird Clowes, so that nothing is to be gained by repeating them; but, while concurring in most of his deductions, I think he has underestimated the importance of the ram.

Possibly the fact that the "Shah" was not fitted for ramming may have escaped his notice; had she been so, it is scarcely likely that with her superior speed the "Huascar" could have escaped either her ram or a torpedo fired at close quarters.

The naval warfare consequent on the late civil war in Chili has afforded an example of the power of the torpedo in the sinking of the "Blanco Encalada," on April 23rd, 1891, in Caldera Bay. In this case the "Almirante Lynch" and "Almirante Condell" were torpedo gunboats of the latest type, built in 1890, by Messrs. Laird, of Birkenhead, while the "Blanco Encalada" was built in 1875, and presumably not subdivided into as numerous compartments as vessels of more recent construction, though her scantlings are probably quite as heavy.

The utter abandonment of all precaution on the side of the "Blanco Encalada" appears to deprive the incident of much interest from a tactical point of view.

Assuming, therefore, that single-ship actions between cruisers of

current types would generally be fought on the principle indicated in this paper, it appears only necessary to examine the case where one combatant, whom we may call "Aries," either specially constructed for right-ahead attack, or conscious of markedly inferior gun armament, should determine to keep his opponent right ahead continuously.

If the other, who may be called "Sagittarius," decide to keep "Aries" as far abaft the beam as is consistent with his guns bearing, and has arcs of training to his broadside guns extending to 60° before and abaft the beam, he will subject "Aries" to a superiority of fire, for a period whose duration will depend upon the relative speeds of the ships. Moreover, when "Aries" approaches within torpedo range, he will offer a favourable mark for the torpedo of "Sagittarius," unless he has succeeded in destroying the latter's torpedo equipment. On the other hand, should "Sagittarius" suffer damage to motive or steering power, he will incur great risk of being rammed, though, if his torpedo gear is intact, he will be able to torpedo his approaching adversary.

In order to estimate the probable extent of the superiority of fire alluded to, the case of two "Piemonte's" is taken, supposed to be steaming at equal speeds of 20·5 knots, being the maximum natural draught speed credited to the vessel. "Piemonte's" armament, as stated by Mr. Watts, in his paper read at the Institute of Naval Architects, April 11th, 1889, is four 6-inch guns, three $4\frac{3}{4}$ -inch guns, five 6-pr. Hotchkiss guns, five 1-pr. ditto, and four 10-mm. Maxim guns, can be fired on either broadside, while three 6-inch, four 6-pr. Hotchkiss guns, two 1-pr. Hotchkiss guns, and two 10-mm. Maxim guns can be fired either right ahead or right astern.

The diagram (2) shows the vessels during a period of five minutes, and at distances apart varying from 2,400 to 590 yards.

Should they be credited with continuous firing from right-ahead and broadside armaments respectively, the case will stand as follows:—"Aries," firing right ahead, will have expended 75 6-inch shell, 500 6-pr., 300 1-pr., and 7,000 Maxim bullets; while "Sagittarius," from his broadside, will have expended 100 6-inch shells, 105 $4\frac{7}{8}$ -inch shells, 625 6-pr., 750 1-pr., and 1,400 Maxim bullets. Thus "Sagittarius" may claim a superiority of 25 6-inch shell, 105 $4\frac{7}{8}$ -inch shell, 125 6-pr., 450 1-pr., and 7,000 Maxim bullets.¹

As regards impact, the guns of "Sagittarius" would be more enfiladed by the fire of "Aries" than the latter's by the fire of his opponent. The crews of disengaged guns on both sides would probably be kept as much as possible under cover from small projectiles and Maxim bullets.

The guns of "Aries," on the other hand, bearing on his adversary, and exposed to such a torrent of projectiles, could scarcely fail to be disabled, which might induce him to alter his tactics.

According to the table given in Admiral Colomb's War Game, the shots of "Sagittarius" would be of more value, shot for shot, than

¹ Mr. T. Van Roosevelt, in his "History of the Naval War of 1812," states that in the action between the "Shannon" and "Chesapeake" only fifty-six round shot struck the "Chesapeake," which was carried by boarding.

those of "Aries." It appears probable that such a superiority of fire would be too great to be voluntarily encountered, except under very exceptional circumstances, so that the attempt to approach end-on appears disadvantageous, and there appears no other alternative to gun tactics, at least in the first phase of an engagement.

It may be remarked that a similar study, made some eleven years ago, before the installation of machine and Q.F. guns, showed a superiority of fire in ships of similar size of only twenty-four to eight, and this example may serve to show what a torrent of projectiles will be fired from a vessel while her weapons are undamaged.

Turning now to the case of ships acting in concert, Captain Noel pointed out some years ago the necessity for defining the meaning of support. Directly two or more ships act in company, the necessity for organized movements becomes evident, and it may be remarked that in the action off Angamos, between the Chilean ships "Almirante Cochrane" and "Blanco Encalada" and the Peruvian "Huascar," the absence of concert appears to have very nearly led to disaster, as we are told that a shot from the "Cochrane" struck the "Blanco Encalada," and that the consorts nearly rammed each other.

Thus it seems evident that when two or more ships are in company, action on a preconcerted plan will be essential, both for their own safety and to unite their forces successfully against an enemy.

Should a battle between fleets become, as is sometimes said, a *mêlée*, in which every ship acted independently, it seems probable that many cases of involuntary damage to friends would occur, but it is difficult to contemplate such a scene of confusion as the result to disciplined forces of the effect of battle, unless the destruction of all leaders had reduced a fleet to a mere mob of ships, so that while doubtless damaged communications would introduce occasional disorder, the fleet of any great nation would preserve its cohesion more or less, until reduced by the fortune of war to such a disadvantage as to be compelled to fly, or able to compel the surrender of its opponents.

By support, then, I understand the maintenance of such a position relatively to the other vessel or vessels in company that the fire of the ships could be united efficiently against an enemy.

Further, that the position of the vessels be such that an enemy attempting to ram one would himself incur serious risk of being rammed by the other.

The distance apart at which ships of a squadron are to keep station affects the question of artillery support. Two cables appears to be accepted generally as most suitable, and considering the result of damage to communications or steering gear in action, no less distance is likely to be accepted on the open sea.

This being so, it follows that the number of ships which can unite their fire efficiently against an enemy approaching from ahead is limited, and may probably be estimated as not more than four ships in single line ahead, such a line extending over a length of 1,000 yards.

The formation in line ahead is that ordinarily used for navigation,

especially in circumstances of difficulty, and when it is considered that the maintenance of any other formation involves the use of the compass, which is likely to be shot away in action, it seems probable that its advantages as regards facility of maintenance will outweigh any disadvantages it may have from other points of view.

When two ships are in line ahead the arcs of fire interfered with by each other's hulls are a minimum. It is true that the right-ahead fire of a squadron is reduced to that of one ship, but the assumption of a very slight *échelon* or quarter line will set free the bow fire, if required, and this on either side of the leader.

The more the *échelon* approaches to a line abreast, the nearer will the vessels composing it approach equi-distance to an enemy approaching from ahead.

A distance of one cable, or 200 yards, on either side of the wake of a ship would suffice to enable a following ship turning across it to assume an efficient ramming angle at the point of intersection. If two ships are 2 cables apart, the bearing of five points abaft the beam of leader would cause the follower to assume such a position. (Diagram 3.)

The speed at which a fleet would engage must depend on the condition of the ships composing it. Admiral Bourgois tells us that in one squadron employed during the Franco-Prussian war a speed of 8 knots was laid down in orders.

In the present discussion I shall assume 12 knots as the speed maintained. It allows a margin for increase with all recent ships, and a considerable margin of superiority to the high-speed cruisers accompanying a modern fleet, which is essential. It has one subordinate advantage for purposes of discussion, that the interval between ships of 2 cables is, at that speed, passed over almost exactly in one minute, so that, if four battle-ships are proceeding in line ahead at 12 knots, the sternmost one will in three and a-half minutes occupy the place of the leader.

Admiral Bourgois pointed out that superiority of numbers is nowhere so important as in the ramming attack; two ships well handled must succeed in ramming any single opponent bold enough to encounter them, and, in view of this, an organization of the fleet in pairs, as ordered in one of the fighting memoranda mentioned by Admiral Bourgois and approved by Vice-Admiral Sir Ed. Fremantle, K.C.B., in his paper read here in 1886, seems to possess great advantages, not the least of which is the power it gives to Officers detached in pairs to handle their ships in concert, and satisfy themselves as to the best means of utilizing their powers. In this connection, Captain, now Admiral, R. D. King's, R.N., "Remarks on Naval Battle Training," published in 1883, merits notice.

It now appears improbable that a fleet on the open sea will be accompanied by torpedo-boats, though if it has to fight in the vicinity of their headquarters they may be expected to intervene.¹

¹ It would be the province of the strategist controlling events to screen his fleet from any unexpected attack by such vessels.

On the other hand, every fleet will be accompanied by cruisers, of which one for each battle-ship would be a minimum.

If, then, we suppose a fleet to consist of twelve battle-ships accompanied by twelve cruisers, the cruisers would require a separate organization to enable them to move in company when not dispersed on scouting duties.

I shall confine myself to pointing out probable positions for these cruisers and the fleet.

1st, when navigating on a voyage.

2nd, when advancing to attack a willing foe of equal numbers.

Diagram 4 shows a fleet steaming in three columns, which may be called the van, centre, and rear squadrons respectively. Their cruisers, which are likewise organized in three separate squadrons, attached respectively to the squadrons of battle-ships, are shown extended in scouting order. The distance to which scouts would be spread would depend on the state of the weather. At night the fleet might probably assume the formation shown in Diagram 5, the cruisers remaining extended but drawn in nearer the fleet.

Diagram 5 shows the fleet in order of battle, the rear squadron being posted a mile astern, to act as a reserve.

An enemy's fleet, supposed to have assumed a similar formation, is shown advancing, the distance apart of leaders being 6 miles, or fifteen minutes at combined speed of 24 knots.

The cruisers on both sides, which may be supposed to have extended across the front of each fleet to obscure its formation and movements, are shown, formed in squadrons a mile to the right of their respective fleets.

The great desideratum in naval tactics, that of doubling on your enemy, as was done in such a brilliant manner by Lord Nelson at the Battle of the Nile, would appear very difficult to achieve simultaneously when fleets are in motion on the open sea, while, on the other hand, Vice-Admiral Sir Edmund Fremantle pointed out here, in 1886, how it might be done successively in the case of a fleet on a wide front attacking one on a narrow front.

The line I have shown, if opposed to eight ships in line abreast, would receive the fire of their right-ahead guns, or eight against two, while passing over the 2,000 yards, which, if both are going 12 knots,¹ would occupy 2 minutes 28 seconds, and if fleet A concentrated his fire on the leader of B he would suffer severely.

The plan of battle on both sides will no doubt have been matured beforehand, and I shall only offer the following remarks:—

If the range at which fire becomes effective be taken at 2,000 yards, which is passed over by vessels nearing each other at a combined speed of 24 knots in little over two minutes, there would not be time, after approaching to that distance apart, for either side to assume a different formation before being intersected by the other fleet, should its leader elect to continue his course.

Is it then possible for one leader electing to begin the engagement

¹ Knot at Greenwich 6082·5 feet.

with an artillery duel beyond torpedo range, to prescribe the manœuvre by initiating a movement involving a corresponding action on the opponent's part?

If both fleets continue their course there would be no advantage to either side, but the leaders encountering the fire of a line in succession would probably be crippled or reduced to a sinking condition.

If both fleets turned sixteen points in succession, leaders first, they would each deliver their fire against their opposite numbers, and no advantage to either side is apparent.

If fleet A turns four points to the right in succession, and fleet B does the same, they would exchange their fires on an equality.

If fleet A turns four points to the right while fleet B keeps straight on, B's van would pass through between the van and centre of A, receiving the fire of A's van and torpedoes from the Nos. 3 and 4 of A's van, while, if they attempted to ram any ship of A's van, they would almost certainly be rammed themselves immediately afterwards by the centre of A's fleet, and, supposing them to pass through without collision, they would, whatever they did, be subject to a superior fire.

If B's leader ordered a course at right angles to A's directly he saw him alter course, their fleets would intersect each other's lines in about four minutes, supposing them 2,500 yards apart to begin with. In such a case, the leader of B would receive a very heavy fire from A's van, but if he escaped damage to his steering gear, he might ram one or more of A's van.

This would not be in accordance with gun tactics, but may be considered. No advantage to either side is apparent.

The possible case of one antagonist assuming line abreast was shown here by Vice-Admiral Sir E. Fremantle in 1886, when the line ahead was shown to have an advantage if passing through between two ships, and has been already alluded to.

The effect of damage likely to be incurred from an enemy's fire while approaching to ram is very difficult to estimate, and should exercise much influence on the decision of the question.

If B's leader took the course of attempting to ram A's van, he would in any case, as both fleets are going at a high speed, be undertaking a task requiring great skill and no accident to gain success, while if accident to his steering gear occurs at a critical moment, his attack would be disadvantageous to him.

Altogether it appears most probable that if one combatant turned off to bring his broadsides to bear, the other would follow his example at the outset of an engagement, unless some peculiarity in the vessels of one fleet pointed to the greater advantage of the other form of attack.

Some event of importance to one side or the other would sooner or later occur, determining the course of an engagement, by rendering it imperative to succour some disabled ship, and it would be futile to attempt to carry the movements further.

It seems clear, however, that if both fleets be supposed equal as regards skill in gunnery and numbers, advantage would remain with that side whose organization and experience of combined action

should enable it to preserve its coherence to a greater degree than its opponents, thus asserting a superiority of fire at various phases of the engagement.

A superiority of number would be a great advantage, especially if rams held in reserve until the torpedo and gun armaments of the hostile fleet had suffered material damage.

Concerning the part to be played by the cruisers in a battle between fleets, a greater variety of opinions may be held than as regards the movement of battle-ships. Having fulfilled their duty as scouts, it would probably be the object of both sides to keep them intact during the first onset.

One of their duties, no doubt, would be, as was suggested here by Admiral Sir W. Dowell, in 1881, that of saving life from sinking vessels.

An interesting question arises as to the possibility of a number of cruisers coping successfully with a battle-ship.

In sailing days, the smaller ship was endowed with such a large sail spread in proportion to her displacement that she always had the heels of the line of battle-ship. This, however, is no longer the case: the smaller ship has to carry engines and coals, and, when a sea gets up, is less capable of maintaining her speed than the heavier battle-ship. Thus the cruiser is simply a vessel in which speed in smooth waters and Q.F. guns are the prominent features, while protection even to vitals is reduced to a minimum to avoid the necessity of heavy displacement, and enable the number of vessels capable of going at a high speed for a moderate expenditure of coal to be augmented.

It is not difficult to conceive circumstances in which high free-board battle-ships would be faster than cruisers; but, on the other hand, in smooth waters the cruisers would have the advantage in that respect.

If we suppose four vessels of the tonnage of the "Latona,"¹ armed with Q.F. guns, and engaging in smooth water, when they would have a superiority of speed, and there would not be much difference in the steadiness of their gun platforms, engaging, say, one on each quarter and one on each bow of a battle-ship from a distance of 3,000 yards, their superiority in light guns would be such that all the unarmoured parts of the battle-ship would suffer severely.

It would, however, be impossible for the cruisers to sink the battle-ship, except with a torpedo, while the battle-ship's heavy guns might destroy the motive power of a cruiser, supposing them uninjured by the lighter projectiles. Should the battle-ship's heavy guns be disabled, she would be at a great disadvantage. On the other hand, if one cruiser's engines were disabled, she would be at the mercy of the battle-ship. If the cruiser succeeded in disabling the battle-ship's armament, they could torpedo her in all probability.

It may be remarked that four "Latonas" represent less displace-

¹ "Latona's" tonnage, 3,000; armament 2 6" B.L., 6 4.7" Q.F., 9 smaller Q.F. guns; cost about 173,000*l*.

ment and cost than our "Royal Sovereign," though the cost of maintaining the four vessels would probably be greater.

Whatever view may be taken of this, it is possible that a squadron of cruisers might be employed to act the part of torpedo-boats rushing past battle-ships at night, or after they were to some extent disabled by an enemy's fire.

To guard their fleet against such attempts or to make them against an enemy would be the lot of cruisers, and would probably lead to cruiser actions. The Commanders of cruiser squadrons would have most onerous and exacting duties, as they would have in many cases to divine the intentions of the Commander-in-Chief, and act on their own judgment for the general welfare.

Should a hostile squadron of torpedo-boats appear, the cruisers would have to deal with it, and, doubtless, much might be done in peace manœuvres to afford young Officers an insight into probable tactical dispositions in war with the movements likely to result therefrom.

The Q.F. gun is likely to produce many vacancies, and while great care and discrimination may have been exercised in the selection of the Officers who are to conduct a fleet into action, it is very possible that those who survive to bring it out may not be gifted with the same ability and experience, and therefore it appears most desirable to extend a knowledge of tactical requirements as widely as possible among the Officers. If midshipmen are acquainted with the tactics in favour when they are under tutelage they are more likely to keep pace with the age they live in, and note the various changes incidental to novel or improved weapons.

From this point of view, the annual manœuvres now carried out by our fleets are most useful and instructive.

Having endeavoured to indicate the possible course of a naval engagement between single ships and fleets, taking the gun as a paramount weapon of offence, but allowing the torpedo a most decisive influence on the tactics observable in the first phase of the conflict, it would appear that the following consequences may be expected to result from the greatly-increased rapidity of fire due to the introduction of the Q.F. guns.

If the zone of effective fire be limited at sea to 2,000 yards, it is clear that the possibility of traversing that zone without receiving a large number of projectiles has disappeared, and as it appears that one nation, at all events, has adopted smokeless powder for service afloat, this deduction becomes doubly justified. The prospect, therefore, of a fast torpedo vessel passing through the zone of fire of a battle-ship during daylight and clear weather is quite a forlorn hope.

Success in naval battles will, more than ever, depend on the effective working of the guns, which is, in turn, largely dependent on the tactics employed.

The first effort will, no doubt, be to disable the offensive power of the enemy by striking his guns and torpedo tubes; and, in the progress of such an artillery duel, a very large number of the guns' crews may

be expected to be disabled, so that the practice of filling up vacant places becomes more than ever important.

In the rapidity with which guns can be fired, we have a means of ascertaining the range approximately, likely to be more practically useful than any range-finders.

It will be expedient not to lose a chance of using the heavy guns, as their shell will exercise a most destructive effect on the unarmoured parts of ships even when fired from positions whence the armoured portions are not penetrable, and it is by no means clear they may not be disabled by light shot striking on the chase.

The fire of Maxim guns and rifles from tops is likely, as pointed out here by Commander Lowry, to be of great efficacy in subduing the fire of all upper-deck guns.

In an action between fleets, the control of gun fire will be very important, both to avoid waste of ammunition and also firing at friends; but it will not be expedient to exercise that control by any other means than through the Officers of quarters, as all mechanical and electrical means of conveying orders or firing guns from a central position are exceedingly likely to be rendered useless by the first hostile projectile striking a ship, unless they are entirely under armoured protection.

For the same reason it appears very desirable that the power of firing torpedoes by sight from the tubes themselves should be arranged for where possible, and it may be remarked that submerged torpedo tubes, such as are fitted in some ships, gain in importance, as the installation cannot be attacked by hostile projectiles. The means of firing them, however, if not conducted under armour protection, should be so arranged as to be independent, if necessary, of broken wires.

As regards construction, the first point that occurs is that the introduction of the 6-inch Q.F. guns as the probable limit to the size of that type of weapon will give stimulus to the endeavours to armour ships sufficiently to keep out the shells from that nature of gun, and the accounts of some recent experiments seem to promise that the last word of armour has not yet been heard.

The much-discussed question of belted *versus* internal protection for armoured cruisers must be alluded to. If a ship will not float or stand upright, and her machinery and steering gear cannot be kept intact, she is obviously unfitted to play the part of a war-ship, but I think the question of the relative merits of the competitive kinds of protection as regards the stability and buoyancy of the ships may best be settled by naval architects.

Mr. Bile's paper on the subject, read at the Institute of Naval Architects in 1887, and the discussion thereon, is most instructive. It seems worth considering whether the belt, if it extends up to the level of the battery deck, is not likely to protect the gun platforms, and hence the offensive power of the ship, better than the internal protection, which will allow shells, striking at any angle, to pass through the side, and, bursting, may probably dislocate the gun racers and pivots.

Most Officers I have spoken to prefer the belt, but where adequate thickness can be given to the internal protection, there is much to be said in its favour except as stated above. The risks incurred by war-ships in action are so numerous and various that it is easy to exaggerate one, at the expense of others.

Coal may be advantageously utilized for protection, but can never be a wholly satisfactory substitute for armour. It is required most above water, and when the supply below is used, it may be necessary, for the maintenance of stability, to empty upper bunkers. A ship dependent on coal protection with her upper bunkers empty would be at a great disadvantage in meeting an enemy, at the end of a voyage, just come out of a port.

The Q.F. gun then seems to afford another reason for increasing the displacement of war-ships to enable them to carry an amount of armour sufficient to afford protection to their vitals and gun platforms against 6-inch shells. When the cruiser of the present day is contrasted with the offensive powers installed on board her, the contrast from the position in the days of wooden ships is very marked. Except in the single risk of fire, the guns of the day are far more powerful to destroy the structure which carries them than they were forty years ago. So long as ships are pitted against ships, the conditions on both sides are equal, and mutual destruction probable, but if ships are pitted against guns on shore, unarmoured ships do not appear to be so favourably situated as in the days of wooden ships.

The thin steel deck-houses which occupy the centre of the deck in cruisers would furnish a large number of fragments when struck by shot or shell, and guns placed on the poop or forecastle appear to occupy a more favourable position in that respect than those in the waist. The space taken up by air-shafts and funnels is, necessarily, large, but it may be well to restrict structures in wake of gun batteries within the narrowest limits, and to use mechanical ventilation where possible to reduce such structures to a minimum so as to free the batteries as far as possible from such sources of langridge.¹

Next in importance to the buoyancy, stability, motive and steering power of the ship, comes the means of exercising control over the two latter powers. These are usually concentrated in a conning tower, a somewhat conspicuous object, by no means in unarmoured ships impenetrable to quick-firing projectiles. It was once remarked by an Officer of great experience that the conning tower should form an integral part of the armoured structure of a battle-ship. When it does so and is capable of resisting 6-inch Q.F. projectiles, its weight is justified and its conspicuousness less important. When, however, as in an unarmoured cruiser, it is merely an excrescence showing in a pointed way whence the ship is controlled, but incapable of protecting the communications even within it against 4·7-inch or 6-inch projectiles, which communications are necessarily exposed to risk over a considerable distance, for the purpose of bringing them to this con-

¹ I saw fragments of brass rubbing pieces on main bitts of "Agamemnon" go through three parts of funnel casing on quarter-deck on October 17, 1854.

spicuous point, it certainly does not seem likely that the conning tower in unarmoured cruisers will survive the early impressions of the Q.F. gun.

If you cannot protect a thing, do not point out where it is, but place the communications as much as possible out of danger, and afford the Officers controlling the ship such shelter in an inconspicuous manner as may be feasible.

The effect of shells on unarmoured structures is well known, and to carry up steering rods and telegraphs through unarmoured structure into a small thinly-armoured apartment in a conspicuous position appears to me a mistake.

The fate of the "Huascar's" conning tower was such as to cause much reflection as to the expediency of devoting weight to such structures. All the communications being there, it must perforce be occupied unless the still more vulnerable position of ordinary navigation be occupied, and both of these positions have the disadvantage of affording conspicuous marks to an enemy's gunners. I am speaking more especially of the rods and telegraphs, damage to which at once renders the conning tower useless. The men may be replaced, but one shell among the communicating rods will probably render them useless for that action.

The object sought would rather, it appears, be attained by the principle of concealment, or avoidance, as Admiral Colomb has called it, and on shore we hear much more of pits for guns than of towers.

The wires for lighting a cruiser internally are likely to be cut frequently in action, so that no reliance should be placed on electric lights for any places required in action.

Loth as we may be to place armour on a ship, in view of its inutility against torpedoes, yet Q.F. guns, smokeless powder, and high explosives renew the old cry of "Keep out the shells," and would appear to make its application to a limited extent most desirable in all ships designed for war purposes.

The great difficulty caused by the high freeboard necessary for the maintenance of speed in a seaway is that the area to be armoured becomes so large as to make it impossible to cover it all, but it seems a question whether the central portion of cruisers should not have a belt sufficient to keep out shells in combination with the internal arrangements generally made use of for other parts of the vessels.

With the object of defeating torpedo-boats, a number of torpedo-boat catchers are now built to which speed is essential, while a very light armament will suffice, more especially as rapidity of fire is much more important in their case than anything else. Such vessels are very useful for the purposes for which they are designed, but it should not be forgotten that, no armour being possible on their displacements, they are unfit to engage protected vessels, and so long as they possess superior speed in smooth waters to torpedo-boats, they are sure to be yet more swift in proportion when a sea gets up.

As regards protection to the guns' crews, everything that appears feasible as regards shields may be seen in progress in our workshops.

It is a great thing to place guns so as to reduce the risk to the crews as much as possible to the direct hit, and avoid the inevitable shower of fragments which must be caused by a shot striking neighbouring structure.

From the foregoing imperfect review of the salient points of the results of introducing Q.F. guns, it would appear that in naval actions it will be most important to develop as heavy a fire as possible for a short time, with a view to which as many guns of adequate power should be mounted as possible. Coals will have to be replenished so often that other stores can be filled up at the same time, and all available weight devoted to offensive power.

It is impossible not to sympathize with the naval architect of the present day whose ships are a mark for such destructive weapons, both above and below water, that it is most difficult to see in what direction progress lies.

Where a theatre of war will admit of small vessels maintaining their speed, and the base of supply is near at hand, economy may result from the employment of moderate sized vessels, but where high seas prevail and base of supply is distant, we may be sure large displacements will be essential to efficiency, and must be prepared to pay the cost. No doubt the practical rule to make our ships somewhat superior to those of our possible enemy may suffice, if we are certain that his requirements in war and our own are similar, but this is a matter of practical statesmanship.

The only satisfactory point about the vast expenditure now incurred in all countries for the manufacture of war material appears to be that hitherto it has resulted in the maintenance of a far larger population than it has ever destroyed, with which reflection, not perhaps a wholly satisfactory one to the objects of destruction, yet a decidedly good feature to dwell upon, I must conclude my lecture.

Comparative Table of Guns.

Ship.	Description of gun.	How worked.	Weight of projectile.	Results.
" Benbow "	16·25-in. 110-ton B.L.	Hydraulic	lbs. 1,800	3 rounds in 6 minutes, starting from gun loaded.
" Trafalgar "	13·5-in. 67-ton B.L.	"	1,250	4 rounds in 9 mins. 7 secs.
" Colossus "	12-in. 45-ton B.L.	"	714	4 rounds in 6 mins.; target struck 3 times.
" Thunderer "	10-in. 30-ton B.L.	Hand	500	1 round in 2 mins. 10 secs.
" Impérieuse "	9·2-in. 22-ton B.L.	"	380	5 rounds in 6 mins.
Cruisers	6-in. 5-ton B.L.	"	100	1 round a minute.
Cruisers and battle-ships	6-in. 5-ton Q.F.	"	100	5 rounds in 55 seconds.
Cruisers	4·7-in. 2-ton 1 cwt. Q.F.	"	45	12 rounds a minute.
Torpedo-boat catchers	3·75-in. ? 25-pr. Q.F.	"	25	12 to 15 rounds a minute.
Battle-ships and cruisers	6-pr. Q.F. Hotchkiss	"	6	25 rounds a minute.
"	3-pr. Q.F. "	"	3	30 rounds a minute.
"	1-pr. Q.F. "	"	1	About 30 rounds a minute.

Figures derived from "Modern Naval Artillery" and Major Clarke's "Fortification."

The CHAIRMAN: We have listened with great pleasure to this lecture, and a very instructive one it has been, particularly as it deals with a subject which none of us know anything about practically, whatever we may know theoretically. I am not sure that it is not one of those subjects where "When ignorance is bliss it is folly to be wise." I hope, as there are some naval architects present, they will take part in the discussion. We shall be happy to hear them.

Admiral Sir GEORGE WILLES, K.C.B.: I do not wish to take any part in the discussion, and will leave it to younger men. The lecturer tells us, at page 3, that the "Shah" was not fitted for ramming. I do not believe that the "Shah" has a cutwater. I do not think any ships had cutwaters since the "Black Prince" and the "Warrior." In my opinion, every modern ship is capable of ramming, and, like Admiral Long, I have never been able to understand why the "Shah" did not try to ram the "Huascar"; and after the statement of the lecturer as to the number of shots fired from the "Shannon" and "Chesapeake" which were effective, I do not think the "Shah" would have been much damaged by the "Huascar's" fire. The lecturer quotes the opinion of Admiral Bourgois. I knew him very well. He had the reputation in the French Navy of being a purely scientific Officer, and most unpractical. I do not think we ought, therefore, to attach *too much* importance to his opinions.

Lieutenant STURDEE: I did not expect to open the discussion, but I appear here as a torpedo-boat Officer, and I do not think that torpedo-boat Officers often have a hearing in this Institution. Sir William Armstrong's firm have made rather a large statement, which is quoted by Admiral Long; it may have done for exhibition purposes, but I do not think it can be ever borne out in a practical way by actual results. I have taken part in several torpedo attacks, and no doubt there are others here who have done the same; I know that Admiral Long has taken part in many himself. What I would like to point out is that there are several points in that statement that are not borne out in practice. The first one is the statement mentioned that a torpedo-boat can be seen at 1,700 yards. That I am sure is not practically true; of course I am referring to a night attack. The second statement is, that the use of smokeless powder is assumed; that is a condition we have not yet reached. The next thing is, it does not take any notice of the accuracy of the fire, which is a very important thing; neither does it take any notice of firing into a friendly ship. It is stated that if, instead of three Service 5-inch guns, the ship were armed with three of the quick-firing guns, she could fire seventy-two shots in two minutes, but none of them probably, excepting the first few, would be aimed shots at all. It would take a very good gunner to make good practice under the circumstances, with his ship rolling and the boats continually altering their bearing and distance, and probably steering different courses. To take these points in more detail: as to the first point about *invisibility*, I think if you look through the number of torpedo attacks that have occurred, you will find, in the majority of cases, the boats have not been seen at distances over 1,000 yards, and in many cases they got nearly alongside before anyone knew they were there. I have seen cases of that, and have known cases where the boat, in a single ship attack, has not been seen, and it has actually come alongside, and made fast, and the men come inboard without being discovered. The Umpires in the manœuvres, I know, have a very difficult task to decide on different points, but if I may venture to offer a suggestion, there is a time limit now which tells very hardly against torpedo-boats. I fancy the reason is that everyone in the ship, from the Captain downwards, feels it an indignity to be put out of action by a little "mosquito," probably barely one-hundredth the tonnage of the ship, and as the time is taken from the first gun, which there is no rule should be aimed at the boat, and probably in many cases to the "cease fire" bugle, it is probably stretched in favour of the ship. This, I am sure, is felt by every torpedo-boat Officer, and I humbly suggest that the conclusions arrived at are not those that will probably be obtained in actual war. Might I suggest that the claims be kept by the Umpires until after the manœuvres, when both sides would have had a chance of a hearing, and then certain points be allowed for each case? I think some arrangement of this sort would enable a more correct result to be arrived at, which, I feel sure, is one of the main objects of the annual manœuvres. When you are discovered the cry is "Torpedo-boat!" What is the

first thing that happens? A gun is fired off to take the time by. The first gun is never pointing at the boat. The torpedo-boat Officers can see better than the men and Officers of the ship, and it is a proverbial fact that the gun is generally fired on the wrong broadside, and quite irrespective of the position of any friendly ships, and as the friendly ships occupy a very much larger arc of training for the gun than a little torpedo-boat, the friendly ships, I believe, will suffer more than the boat. There is one case in point at Plymouth. The first attack, in 1890, came in through the eastern entrance, and the second through the western one. The firing for the second attack was started from the eastern end of the Breakwater, which could have been of little or no effect.

Admiral COLOMB: I rise to order with regret, but I am always afraid, in this Institution, of seeing discussions turn off in the wrong direction. It is very easy just now to get on the torpedo-boat, and the lecture is not on the torpedo-boat attack.

Lieutenant STURDEE: I beg pardon. I was trying to point out the rôle of quick-firing guns *versus* the torpedo-boat. As to the quick-firing guns, it seems to me that, after the first boat is seen, the electric light is probably put on that boat, and the other boats coming in are not seen, and therefore a large number of unaimed shots are fired in any direction. To take the case referred to by the lecturer, the attack on the "Blanco Encalada" by the "Almirante Lynch" and the "Almirante Condell." The facts, as taken by one of the Officers of the flag-ship, and also the Captain of the "Almirante Lynch," seem to be these:—Fire was opened after the "Almirante Condell" fired the second torpedo; the "Almirante Condell" then cleared out, and the "Almirante Lynch" was 600 yards off, and came in and fired her first torpedo within 150 yards. They went full speed astern, to save ramming the "Blanco Encalada." The "Almirante Lynch" put her helm hard-a-port. Before firing the second torpedo four minutes had elapsed within 150 yards of the "Blanco Encalada," that ship being armed with two quick-firing guns and one or two Nordenfelts. The actual effect on the "Almirante Lynch" was this: there were four hits—two under the poop and two forward—and one man was wounded. These four hits were of practically no importance. Then they went out and met the "Aconcagua." There was an engagement of forty minutes at ranges between 3,500 and 500 yards. The number of shots fired were—the "Aconcagua," 160 shots; the "Almirante Lynch," 407; and the "Almirante Condell," 200. The "Almirante Condell" was not hit at all; the "Almirante Lynch" was hit three times. One Nordenfelt bullet struck her close to the water-line opposite the boilers, and one 3-pr. struck the water-line aft and one forward, so that they were practically uninjured. The "Aconcagua" was hit seven or eight times, all in deck-houses and awnings, not one actual hit in the hull. Then there have been experiments as regards firing at sections of torpedo-boats, and you will find that, in each case, there have been but very few hits in proportion to the number of rounds fired. Judging by the hits on the target at night-firing, I do not think the superiority of quick-firing guns is borne out by the facts. They act very detrimentally in the way of intensifying every false alarm, which are in the proportion of three to every real attack, and a large amount of ammunition is often expended on those occasions. The result is, the ships may possibly run short of ammunition before a real attack takes place. Admiral Long referred to the torpedo-catchers. Whether they are the best way of catching the torpedo-boats depends of course purely upon the quick-firing guns, and if the effect of quick-firing guns is so great that they can sink the torpedo-boat, of course the torpedo-catcher is the best way of catching the torpedo-boat. If the torpedo-boat has a very large superiority of speed over the torpedo-catcher, I doubt whether it is the best way of catching the torpedo-boat. I was glad to hear Admiral Long speak very highly of the submerged tube. Of course we have been driven down to submerged tubes by quick-firing guns, and that is one great effect of the introduction of quick-firing guns. In the case of the "Royal Sovereign" class, a beginning was made to protect her above-water tubes, but for Admiral Long's suggestion for second-class cruisers to run the gauntlet, the above-water tubes require a little more protection than they have at present.

Vice-Admiral Sir EDMUND FREMANTLE: As my name has been alluded to two or three times in a friendly and complimentary way by the lecturer, I should like to

say a few words. The first thing that strikes me in his lecture is that it is very complete. There is a great deal of thought in it, and I am quite sure, though we may not entirely agree with him as regards what ought to be attempted in meeting an enemy, that there is a great deal of study and thought in it, and we shall learn a great deal from it. The next thing that strikes me is that we do not see, in this Institution, a large number of young Officers. I am sorry to say this Institution does, to a great extent, lack young Officers, especially of the Navy, who naturally are not very much in London. I make these remarks because the lecturer observes very properly that a question of tactics and a question of quick-firing guns, or of torpedoes, or of any other question connected with warfare, is one which should be studied quite early and young, and I think that those who do begin that study earlier and younger than most of us did, will have a very great advantage. It is, perhaps, unnecessary for me to allude to it, but Captain Mahan's recent work¹ touches very closely upon the question of naval Officers thoroughly studying questions connected with war. He has stated very truly, as it seems to me—it is well thought out like everything in the book—that English naval Officers were very frequently very fine seamen and very good Officers, or thought so in peace time, but that they occasionally failed and failed curiously in action from want of study of naval war. He mentions this more especially with regard to Matthews' action of 1746. The next subject with which I think we shall all agree is the question of conning towers. I entirely agree with the lecturer that it seems a very strange thing that it should be so, that the naval architects should have insisted upon gathering together all the necessities for the management and fighting of the ship in a conning tower which is not defended properly from the projectiles which will be showered upon it. There is the excuse, of course, that quick-firing guns did not exist when most of our ships were laid down, and that has made a very great change, but we see, even in the case of the "Huascar," the extreme danger of having everything brought together in one spot which was not protected. It would seem to me that, after all, anything would be better than that. I recollect the story of a Yankee who was giving his experience of what had happened in the American Civil War. He had been in command of a turret-ship. A lady said to him, "Oh, no doubt you always were inside the turret." "No, ma'am," he said, "I was not inside the turret." "Oh, really," she said "then where did you get to?" "Well, we were generally attacking forts," he said, "and I got on the lee side of the turret so as to have two thicknesses of armour to protect me instead of one." Then there is the question of the armament of cruisers. I think, when people talk of having a very large number of cruisers instead of our large battle-ships, they do not sufficiently think of the question of their respective armaments and the protection afforded. It has been brought to our notice very properly by the lecturer, and still more clearly in the work on fortifications by Colonel Clarke, that the cruisers built now, though they carry unquestionably a good armament, but having necessarily great speed, they have very little protection and are very vulnerable. It is a satisfaction to us to think we need not consequently arm our coaling stations quite so much as was thought to be necessary a few years ago. At all events, I perfectly agree with the lecturer and Colonel Clarke, that the armament of our cruisers is such that the strength of a cruiser is only sufficient to fight its own equal, and that she is not of much value against a fort. There is another question of detail, certainly, but I think we have all been trusting very much to the electric light, and as the lecturer has shown us, it is an extremely dangerous thing to trust to implicitly in action. I think we should always have some alternative means of lighting ready instead of trusting entirely to the electric light. This refers more particularly of course to unarmoured cruisers than to vessels where the electric light is so entirely protected as in some of our first-class battle-ships. We have had recently in the papers a considerable discussion on the question of torpedo-boats, and torpedo cruisers. I do not propose to go into that now, but it does strike me that the remarks of the lecturer are as true and just in that case as they have been in most of the lectures which he has given us, and that is, that if our torpedo cruisers are to compete with

¹ "The Influence of Sea-Power upon History." By Captain Mahan, U.S. Navy.

torpedo-boats they should have certainly equal if not greater speed. I quite admit that as a rule torpedo-boats, after steaming a certain time, say six hours, can no longer go at the speed which we see on paper, and very often the cruiser of 19 knots may catch the boat of 22—in fact, I am under the impression she generally will, but still the time will come when the torpedo-boats will run out of harbours and be at their best, and they will run at 22 knots. It will be idle, under those circumstances, if the water is smooth and the weather fine, to send torpedo-boat catchers after them, which can only go, say, 19½ knots. It was not my intention to take much part in this discussion, but as my name was mentioned so many times I thought it right to do so. There is one other point to which I should like to allude, which I think the lecturer has brought clearly before us, that is, that we must in future, in the beginning of an action, as far as possible avoid presenting our broadside normally to the enemy, and that we must show more or less an angle, and engage partially bow on, and that the position of 45°, which I think he seems rather to lean to on four points, was one which was especially favourable as enabling you to use all your guns on one broadside, whilst at the same time not being placed in a position normal to that of the enemy.

Captain MAY, R.N. : Admiral Long has brought so many subjects before us that I shall try, as far as I can, to keep to the question of change. The quick-firing guns have come in : what change has been introduced ? I think Admiral Long has shown forcibly that any change goes to the benefit of the gun. We have three weapons—the gun, the ram, the torpedo. The gun has now been greatly improved, that is to say, it is more important than it was five years ago, and therefore our change must be in the direction of considering that the power of the gun has increased and we must regard it more. First of all, as to tactics. The only fleet action under comparatively modern conditions that I know of is Lissa. There the ram came to the fore—Admiral Tegethoff found the ram his winning weapon ; he charged down amongst the enemy's fleet and defeated them. That seems to me reasonable and rational. You think the ram is superior ; so you charge down amongst the enemy to use it. As far as I understand Admiral Long, he thinks now that the gun has so much improved we cannot do that any longer. We must begin, I understand him to say, by keeping off from the enemy until our superior gun-fire has given us some advantage when we may go into close quarters. If that is so, the problem is how are we to do it ? I must say, having tried to follow Admiral Long's diagrams, I have not succeeded in forming any opinion as to how, if I were disposed to remain at 1,000 yards, and use my guns, I am to keep off from another fleet who wanted to charge and use their rams. Questions of that kind appear to me to be constantly coming up, and as far as I can see they cannot be studied entirely on paper. We want to study them at sea. We tried in a small way, when I was in the Red Sea, to do something of the kind in boats, but it was not very satisfactory. Still I thought we learnt a little. It does seem to me that we do want some tactical school. It has been recognized that although gunnery can be learnt in a seagoing ship, and torpedo work also, still we want schools to study everything new, and to keep everybody up to the mark. And it does seem to me we want something of the kind in tactics, or seamanship, if you prefer to call it so, at our ports, where those problems could be worked out, and young Officers instructed as to what is right and what is wrong. That seems to me a necessity of this change. Then there is another thing which appears very necessary. We hear a great deal of the word "fire discipline." In the Army a rapid-firing weapon has been introduced on shore. The power of small arms is greatly increased, and it is found by all armies that the result is to throw more responsibility on the junior Officers, the company and battery Officers, corresponding with our Officers of quarters, and that what they call "fire discipline," that is, control and direction of fire, is therefore of increasing importance. And so it appears to me that that is another necessity of this change, that we should pay more attention to the control of fire. Lieutenant Sturdee told us how lightly a torpedo Officer regards our fire as it is at present, and I am sorry to say I agree with him to a great extent. Admiral Long has told us that the quick-firing gun is its own range-finder, and I believe if the Officer, having his men in perfect discipline, can keep control over the fire, though we may not be able to stop torpedo-boats, at any rate

we shall be able to make it rather hot for them. With regard to stopping a boat, I may say I agree with Lieutenant Sturdee, because, if we look back to fighting in the old days, a 32-pr. loaded with grape ought to have stopped a pulling boat. It seldom did so, and the boat often pulled alongside a ship without very much damage, and I believe the same thing will happen again. Then one word about keeping your ships in an oblique direction. Now-a-days that we have so much curved armour, turrets, barbettes, redoubts, and the much-abused conning tower, I do not think the oblique direction is so important. If a shell comes in on the bow, 45° from the line of keel, and bursts, the splinters will diverge another 45° , and will rake the deck, going nearly fore and aft, whereas if the shell comes in directly abeam, you only get your angle 45° , and probably only one gun on the fighting side is injured. I think that is important, and we cannot afford to disregard it. As regards construction, may I say one thing? It appears to me that there has been some little confusion as to the number of hits a ship will get, because a quick-firing gun has been introduced. I take it the number of hits a ship will get in action depends upon her endurance. Admiral Long told us the "Chesapeake" received 56 shots, and then struck. Then I would say the endurance of the "Chesapeake" was 56 hits, and that it did not matter twopence to the "Chesapeake" whether those hits came from quick-firing or slow-firing guns; as soon as she received 56 hits, she must strike. If that is so, it seems to me that in considering the question as to whether a conning tower is sure to be hit it does not matter whether the enemy has quick-firing guns or not. The 56 hits will be distributed all over the ship in either case, and the conning tower will be hit either by slow or quick-firing guns. Of course the action will take longer with slow-firing guns, but the hits on the ship will only be one number. But if a ship with quick-firing guns meets a ship with slow-firing guns, then of course the 56 hits come in very much sooner than the slow-firing ship can get 56 hits on the enemy, and she will undoubtedly have to strike. As to armour, if the guns are so important, what we want, it appears to me, is more armour: that means more displacement. That I should gather would be the change which quick-firing guns have entailed on our shipbuilding. The gun has to be resisted, not the torpedo or the ram so much, and armour will resist the gun. Now if we take the cruiser whose conning tower Admiral Long talked about, she has no armour that will resist quick-firing guns of the present day. The conning tower which was abused was made to resist the quick-firing guns of that day; unfortunately it does so no longer, and therefore now you are in the same position that you were in the days of the unarmoured frigate—the whole of the cruiser, conning tower, and everything else is practically unarmed. The only thing we can do is to put armour; then she gets bigger and becomes an ironclad. We must steer the ship from somewhere, we must steer her from above water, and is it worth while to put gunproof armour on the conning tower alone? We cannot do it. The only alternative appears to me to be to have several stations from which you may steer the ship, and if one is knocked away you can go from one to the other.

Admiral COLOMB: This lecture is on "The Probable Influence of the Introduction of Quick-firing Guns on Naval Tactics and Construction." We are not discussing quick-firing guns *per se*; we are simply examining the position that quick-firing guns will give you so many more shots per minute—whatever it may be—above others, and what is the result of the rise in the speed of firing. That is the point, and we get it, I think, at once in the two "Piemontes." We see there the key of the position, which subsequent speakers quite agree with. We see it is perfectly evident that you cannot get a rapid fire from the bow position, but you can get a rapid fire with your guns from the broadside position. The result is that the effect of the greater amount of fire in a given time, which necessitates assuming the broadside position, is a matter of importance. But that really was always so, and we had always taken it in that point of view. I want to say about the paper itself, that, like everything else that comes from Admiral Long, it is clear, incisive, and lays down principles which, in his opinion, ought to be carried out. My experience on this question is, that, with a careful working from point to point, inductively, as it is called, you are bound to come to the truth, even though you do it only on paper. You cannot complete the truth on paper, but you can approach

it so as to show what your next step ought to be when you get beyond paper. I cannot help dwelling upon that, because I think Admiral Long has again laid down principles which have been laid down here before, and he has shown that those principles have become more widely acknowledged than they used to be. I take the influence of the ram on formations. We are told to-day, and it is important to note these things, because they help us to trace the causes which are to produce the results—we have been told, and as far as I can see most of us have agreed, that the ram does not influence formations in the first instance, but that it is at a later part of the battle that the ram comes in. But that again is twenty years old. I said in this Institution, in 1872, writing on "Attack and Defence of Fleets," "Those who think with me will observe the instinct of the naval world has led it to contemplate the end-on position for hostile fleets, not as the best means of attacking with rams, but as the best means of frustrating an attack of rams. Our opponents will take the opposite view. The latter party will maintain that the ram dominates and prescribes the formation, which is so good a defence against it, that the ram is not the chief weapon in fleet action. And the inefficiency of the ram as the chief fleet weapon, once the end-on position is firmly established, seems to me to be argued by other considerations, which I have not yet seen treated by any writer on tactics." Then again, "Naval strategy, therefore, while it dictates an attack by the ram by single ships as the most effective means of obtaining the victory for him who is most skilful, does not seem to advise that policy in a fleet attack. You must beat your enemy in some other way." That goes to show that it is not the advance of the torpedo which has thrown the ram back, but it is in the nature of things that the ram should be thrown back by the steps taken in defence. The battle of Lissa was mentioned. What made the ram powerful in the battle of Lissa was not the ram itself, but the unskilfulness of the people who met it. If the Italians had turned towards the Austrian fleet that threatened to ram, there would have been no such disaster as happened. Another point which I look upon as most important with regard to the ram, and which was noticed by Admiral Bourgois, although here again it was referred to twenty years ago in this Institution, is where it was shown that the *support* or *guard* was everything. In No. 3 Diagram, the rear ship threatens any ship attempting to ram the leader, and from my point of view prevents the attempt being made. Admiral Long rather spoke as if the *support* would act after the enemy had attempted to ram. From my point of view the work is done by way of threat, sufficiently complete to prevent the enemy from thinking of ramming. It was said, also twenty years ago, when there was only the Harvey torpedo, that the result of the action of the torpedo must be to bring the guns forward. Here we have it pretty well acknowledged that that is so. Then as to the question of doubling upon the enemy, that also I had the honour of bringing forward here, showing that in succession you can double, and that that was the way to do it—in succession, instead of simultaneously, as Nelson did. What I want to impress upon you is, if you will, as Admiral Long has done, follow out these things clearly and distinctly, even on paper, you are bound in the end to come to just results. You need not make mistakes, because if you take your subject from every point, and look at it from every point, you will find probably a mistake one way is corrected by a truth the other way. Twenty years ago I came to the conclusion, which remains unchanged, that to bring the enemy four points on your bow was an important position for you to take up, that you were safer thus than you could be in any other way. You force your enemy to disclose his intentions, which is everything to you, and in disclosing them he gives you, perhaps, the opportunity of taking advantage of them. But we must never forget that, in tactics, all we can really aim at is equality. You must always understand, whatever arrangement you may make in the way of getting an advantage of your enemy, he has an equal power of getting an advantage of you, and all you can do, if you are equally skilful, is to fight on an equality. In other words, your care must be to prevent the enemy taking an advantage of you, rather than to hope to take an advantage of him. Sir George Willes said a word with regard to Admiral Bourgois, which I do not quite agree with. It is perfectly true that Bourgois was a paper man. He was a great mathematician, and a most scientific man, but if you look into what he has

written, you will see most of the things with regard to this question that we now accept.

Admiral Sir EDMUND FREMANTLE: Will you explain the 4-point bearing?

Admiral COLOMB: You bring your enemy four points on the bow. It is too long a story to go into now, but it will be found in the journals of twenty years ago. I was very glad to hear Admiral Long speak out strongly against the *mêlée*. It is an abomination, a thing that no English Officer ought ever to dream about, or think about. It was an idea brought in by Admiral de la Gravière, as if it was a thing that could not be helped, but, as Admiral Long has pointed out to us to-day, the Admiral who has his fleet in proper command will not have a *mêlée*; he will take care to keep his ships together, *coute qui coute*, and to withdraw for a time from the battle to re-form, rather than allow them to get into a *mêlée*, where it is impossible to say who is to win. The value of the 4-point bearing is shown by "Sagittarius" on the diagram. She has taken the quarter 4-point bearing, which comes to very much the same thing, and you see by doing so she has put her enemy at a disadvantage, unless she also takes up the bow 4-point bearing. "Aries" is making the mistake because she does not see what her game is. After she has got pounded of course she does, but not at first. I think the "Shah" did not ram first of all, because she was not really a ram; she had no doubt a spur of some sort, but it was thin iron. Moreover, I do not quite agree with the lecturer in saying it would be very easy for her to have rammed the "Huascar." As far as I have gone into the matter, turning power more than speed has to do with effective ramming in a duel; not, perhaps, in other cases, but in a duel. It might have been a very good thing that the "Shah" did not try to ram, because she might have got it the other way. The value of the line-ahead remains, as far as I can see. I do not see anything to shake the belief I have held for twenty years. It need not be a long line, but, as far as I can see, the man who takes his fleet into action in a line-ahead, moving through the enemy, or passing the enemy, has an advantage.

Sir EDWARD FREMANTLE: Admiral Long does not go into action in line-ahead.

Admiral COLOMB: It is a narrow front.

Admiral FREMANTLE: It is subdivisions—quarter line.

Admiral COLOMB: A narrow front of great depth, which is the general term for expressing "line-ahead," but then we must recollect, as it was very properly put by Captain May, you cannot guarantee that the enemy will meet you as you want him; you cannot guarantee that his fleet will stand towards you. Most likely he will not. If an enemy is determined to make you fight an artillery duel, I think he will turn his stern and fight it out that way. It is only in the cases where the advance is mutual that you get the order of battle that is shown *there*. There are, I consider, five distinct modes in which fleets may fight, and you cannot guarantee any one of those modes, but you can prepare for all of them. As to conning towers, I very much agree with the lecturer. Shortly before I retired from the Service, I had to go closely into it for the Admiralty, and I came quite to the conclusion that we should not have a conning tower in any of our ships. What we want is simply two or three good stout shields on each side of the deck that will keep out a 3-lb. or 6-lb. shell. Simple shelters for the Captain, or whoever is in command of the ship, and for the navigating Officer. Let them seek the position where they will have most shelter. Inside each shield there should be a tube of large diameter, and, below the water line, engine and steering telegraphs should be collected. The orders would then be given by word of mouth down the tubes.¹

Mr. BARNES: I may state that the "Shah" was not a ram; she had merely a stem with a wooden backing, sheathed over with copper. You could hardly say that she had a stem at all prepared for ramming.

¹ Note.—In trying to take a great many heads in a short time, I failed to put the general lesson of the lecture as I wished to do. Its points are:—(1.) The confirming of the theories of twenty years back. (2.) The maintenance of the gun in the first position. (3.) The effect of the torpedo in delaying action at close quarters. (4.) The bringing out by means of the quick-firing gun, into practical relief, twenty years old conclusions, namely, that naval power lies in a numerous artillery on the broadside, and not in small numbers of very heavy guns at the ends.

Captain CURTIS: Moreover, the "Huascar" was the more handy ship.

Admiral CLEVELAND: I concur in a great measure with the paper. I think, however, it has a narrow standpoint, and I regret that the lecturer has associated "Construction" with "Tactics." As I understand Tactics, the tactical problem is how best to apply *existing* matériel in such a manner as to develop the offensive as well as defensive powers of the ship or ships, viz.: the ram, guns, torpedoes, and armour protection. That is the tactical problem, and the "Construction" is thus so far settled for us. I need hardly say how necessary and how important this question of tactics is, and I quite agree with Captain May in thinking it desirable that some steps should be taken to form a "School of Tactics." I am very strongly of that opinion because, before we can satisfactorily discuss the best tactical formation, we must lay down certain broad principles as to the composition of the squadron—the number of battle-ships, the reserve, coal, ammunition, and torpedo dépôt ships; their speed and armament (primary and secondary), and also their torpedo armament (whether our battle-ships are to have torpedo tubes in them, or whether they should be relegated to torpedo gun-vessels in attendance). Then, again, the question of powder—is it to be black or smokeless? Also again, what ships are to be attached to battle-ships—are they to be cruisers? as our lecturer says—or, are they to be torpedo gun-vessels? These are matters which affect the movement of the ship, and therefore the tactical formation of the squadron. Are the steam-boats, especially the 2nd class torpedo-boats, to be hoisted out, or left in the crutches to be destroyed? And further, when these important factors in the problem have been authoritatively laid down, and the best tactical formations (varying with those of the enemy) based upon them, threshed out in "The School," they should be confidentially communicated to Officers in command for their guidance. I do not agree with Admiral Colomb as to the "line-ahead" being the best for attack. I do not profess to be a tactician, but I do think an échelon formation lends itself better to the development of the heavy fire of the battle-ship, and that is a most important thing. I agree with the lecturer with regard to the maximum distance at which we should open fire: 2,000 yards for guns and 600 yards for torpedoes. It of course gives very little time (one minute, both squadrons moving at, say, 10 knots) for reloading, and we should only get one round from our heavy guns before the two squadrons were abreast! The arguments of the lecturer are based upon that table of practice from quick-firing guns which I think will be found to be rather rosy. No doubt, these results have been obtained under favourable circumstances, but my experience leads me to infer that, under Service conditions, we should not get the same results from the quick-firing guns that are recorded there. The term "quick-firing gun" has, so far, lost its meaning. When it was first introduced into the Service, it was a gun which had "fixed" ammunition, and that was a very well-defined line. Now our 6-inch and 4.7-inch quick-firing guns do not have "fixed" ammunition. Relatively speaking, they are quicker firing than their corresponding calibres with the old ammunition, but I think the method in which their ammunition is made up will shortly be adopted for every gun in the Service, and the so-called "quick-firing" guns limited to those which use fixed ammunition. I beg to express my thanks to the author of the paper.

The CHAIRMAN: When I first went to sea, there were two classes of ships in the Navy, the Symonites and the anti-Symonites. Sir J. Graham, when First Lord of the Admiralty, said, "that with the exception of religious controversies, he did not know anything so bitter as the controversy which raged between the Symonites and the anti-Symonites." Now-a-days the controversy seems to be in much the same condition between the torpedoes and the anti-torpedoes, but we shall have to wait for the next war to settle the dispute practically. With regard to the "Shah," I think Mr. Barnes settled that matter. She is not properly a ram. There is one important point that we very much lose sight of in these days, and that is the mischief done by splinters. To show you how our forefathers were well aware of it, in 1708 two privateers, under Captain Woods Roger, went round Cape Horn, and I remember reading that part of the gunner's duty was to clear away certain portions of the woodwork, the reason given was that more people were killed by splinters than by shot. Sir Edward Codrington, writing of Lord Howe's victory on the 1st of June, 1794, mentions Lord Howe sleeping under the poop for

three nights before the action, not a single bulkhead up, and only a simple canvas screen. The reason he gave was, that the cabin was kept clear of anything that would make splinters. At the Battle of Navarino, 1827, the late Sir H. Codrington, then a mid. in the flag-ship, writes, "It was a lucky thing for us that the ships were undermanned in those days, and that we were not able to spare any crews for the guns in the cabin, as the Admiral's cabin, after the action, was a mass of splinters," and he mentions four fowling-pieces, lashed together in the cabin, being struck by a shot; in one, the barrels were separated, and pieces of the splinters were found out in the poop. That shows the extraordinary damage splinters may do. In my opinion, all boats should be lowered, if possible, before going into action, as we saw done in picture of engagement in the last great war, and all booms should be cleared away, and everything that might cause splinters, or burst a shell.

Admiral LONG (in reply): I do not think I have very much to say. I must consider myself fortunate, considering how very little qualified I am to deal with these questions, that I have not been treated more severely. With regard to Sir George Willes' reference to Admiral Bourgois, I may say that I read his book, and I was very much struck with the way in which he anticipated what has subsequently happened. I do not know what he did afloat; I only knew him by his book; I never met him. With regard to what Lieutenant Sturdee said, I am sure I hope we shall be able to persuade him to give us a lecture, but I quite agree that a very large deduction from the figures in this paper would have to be made if you wanted to arrive at how many shots are likely to hit anybody. That is a question which it is almost impossible to discuss. You can only say a quick-firing gun, if fired five times as fast, is at all events likely to make five times as many hits as other guns. Admiral Colomb said, some years ago, that about 2 per cent. might be expected to hit, and of course that 2 per cent. will now represent a much larger absolute number than it used to. Beyond that we cannot go. The attack of a torpedo-boat against quick-firing guns would, no doubt, take place at night, and I quite agree with Lieutenant Sturdee that at night it is not to be supposed the accurate practice will be made at sea, at all events, that is anticipated in that table, or probably anything like it. It can only be taken relatively as showing that whereas you could do certain things before, now you can do a great deal more. The flat trajectories of modern guns, however, are likely to produce much greater effects than the grape shot of old days. With regard to what Captain May said about study at sea being necessary, I must entirely agree with him there. I think these matters can be followed out on paper to a certain point, and then, if two ships are at sea together, they can, if they choose, work it out practically, and get absolutely accurate results as to those particular ships. I think that was a very important remark made by Captain May as to fragments. Of course he speaks with full knowledge of that point and should be attended to. With regard to what Admiral Colomb says about his lectures in times past, I entirely endorse all that. I may say, that his lectures were the first things that induced me to pay any attention to the subject at all, because, in the ordinary course of service afloat, such matters are not brought before us, and I think that is one of the great advantages in favour of this Institution, that these matters are brought before everybody, and young men, as they go on, get hold of things which stir them up to work out these questions. With regard to what Admiral Cleveland said, I think I said in my paper that I did not anticipate that the torpedo-boats would accompany fleets. Of course that was meant to cover hoisting boats out as well as first-class boats. That appears to be generally understood. The French appear to have come to the same conclusion, as the result of their manœuvres in the Mediterranean, that torpedo-boats were more trouble than they were worth directly they got away from land. But torpedo-boats will play their own part from their own bases. I am quite aware that the tactics I put forward must necessarily be imperfect; they are simply the result, in my mind, of what I have heard and seen done and read on the subject, and I hope it may be of some use to others beginning the thing to make a start with. I am very largely indebted certainly to Admiral Colomb and many Officers I see here—Sir William Dowell, Admiral Fremantle, Admiral Willes, and others—for the knowledge that I possess on the subject. I thank you very much for the kind way in which you have received my lecture, and Admiral Sir Vesey Hamilton for taking the chair.

Friday, February 5, 1892.

GENERAL THE RIGHT HON. SIR REDVERS H. BULLER, D.C.,
K.C.B., K.C.M.G., Adjutant-General to the Forces, in the Chair.

MILITARY BALLOONING.

By H. B. JONES, Lieutenant R.E.

GENTLEMEN,—It is not my intention in this lecture to allude to the past history of military or civil ballooning; it has already been done here by Colonel Templer and Lieutenant Baden-Powell, and at Aldershot last year by Colonel Elsdale, and I propose to simply discuss the questions relating to the proper equipment for military balloons and their use in war.

I think that it is now satisfactorily established that balloons will play a very important part in any future campaigns, and be of the greatest service if properly used, and we and all the great Continental nations are experimenting to obtain the most compact equipment.

The first question which arises is how is the balloon with its accessories to be transported on service to where it is wanted, and I will begin with the question of gas.

The three gases at our disposal for inflating the balloon are: (1) Hot air; (2) coal gas; (3) hydrogen.

(1.) *Hot air* is practically out of the question; its lifting power is very small, and a heating apparatus for keeping up the temperature inside the balloon is necessary. This is dangerous enough in a free balloon, but in a captive balloon, which is tossed about by the force of the wind, it is practically impossible. The only possibility of its being used would be if the gas supply failed, and it was a matter of great importance to get a balloon up even for a very short time.

Coal gas has a lifting power of about 35 lbs. per 1,000 cub. feet, and has the advantage of being easily procurable at many places in any civilized country; it is also very cheap, which accounts for its general use by civilian aeronauts.

Hydrogen is a much more costly gas, but its lifting power is from 60 to 68 lbs. per 1,000 cub. feet, and therefore for military purposes, where economy in transport is of the highest importance, it is very valuable.

The amount of gas in the balloon must be sufficient to lift the envelope of the balloon and its fittings, two men, the captive rope, and a supply of ballast, and, in addition, there must be a large amount of buoyancy to withstand the effect of the wind, &c.

The cubic capacity of the normal English war balloon is 10,000 cub. feet, which is, I consider, the minimum. The French use a balloon of 540 cub. metres or 19,000 cub. feet, and transport must be provided for this gas.

The plan of filling the balloon and towing it to the required spot is only feasible when the distance is not great, and would be out of the question on any expedition when the troops would be away from the base for more than a few days, and we are reduced to the following alternatives, viz.:—

(1.) Carrying the gas ready made under pressure.

(2.) Carrying the materials and plant and making the gas when required.

In considering (1), it is obvious that the large volume of gas required must be compressed on account of the transport, and in designing a gas holder the following requirements have to be considered:—

(1.) *Strength* to retain the gas under a high pressure.

(2.) *Lightness* to obtain the maximum of gas with the minimum of weight.

(3.) *Adaptability* to any kind of transport.

(4.) *Power* of transporting large or small quantities of gas as required.

Some of these points are antagonistic; for instance, it would be a saving in weight to carry the gas in very large receptacles on wagons, but then it would be impossible to get along with pack animals, or to take only a small supply of gas.

The English were the first to adopt the plan of carrying the gas ready made, and I will explain the details later on. I will merely state here that each gas tube weighs about 70 lbs., and carries 120 cub. feet of hydrogen. 4 wagons carry 140 tubes, or an equivalent of about 17,000 cub. feet of hydrogen, and the total weight, including wagons, is about 9 tons. The tubes weigh $4\frac{1}{2}$ tons.

We will now consider the alternative method of carrying the materials and plant for making the hydrogen.

Of the various ways of obtaining hydrogen, the most general is by the action of dilute sulphuric acid on iron or zinc. The gas obtained from using zinc is purer and therefore lighter, but iron is more easily obtained.

At Chatham, 6 gallons of acid and 70 lbs. of zinc give 500 cub. feet of hydrogen. This is much above the theoretical amount, but in rough generators, &c., the excess is necessary, especially when time is of importance; therefore, to get the 17,000 cub. feet, which in the other way is carried on the wagons, we require (70×34) lbs. = 2,380 lbs., about $21\frac{1}{2}$ cwt. of zinc, and (6×34) gallons of acid = 204 gallons = $2,040 \times 0.98$ lbs. This gives, allowing for waste, about 2 tons of material.

Captain Espitallier, in a treatise written by him, lays down that 8 or 9 kilos. of iron and acid is required per cub. metre of gas, which gives approximately $4\frac{1}{2}$ tons of material for 17,000 cub. feet.

Sulphuric acid is awkward stuff to handle, and will eat away any

substances it may be spilt over, and would, therefore, require a specially constructed cart for its transport. In addition to this weight there is the weight of the generators and other plant for making, washing, and cleaning the gas, and the weight of the wagons themselves, and, taking everything into consideration, it seems that, at least for the first 20,000 cub. feet of gas, it is easier to carry it compressed.

The following are the chief advantages of the system of carrying the gas compressed :—

(1.) *Rapidity of Filling*.—With the normal English war balloon, the whole process of preparing the balloon for an ascent takes from fifteen to twenty minutes, but, if the gas had to be made on the spot, it would take about four hours, during which time the opportunity of gaining valuable information might be lost or a change of weather arise, and the force be saddled with a half inflated balloon unless the gas were wasted.

(2.) *Purity*.—During the process of compression a great proportion of the impurities in the gas are got rid of, and we therefore obtain a gas with higher lifting power.

(3.) It is not necessary, as in making the gas, to be close to a stream or river. In the process of manufacture a large amount of water is required, which in many cases could not be obtained.

(4.) Owing to either a leak, however small, in the balloon, or to the variations of temperature and pressure, there is always a daily loss of gas, which is easily made up by putting in a tube of gas; but if the gas has to be specially manufactured, it may cause considerable delay.

Against the system of steel tubes there is the fact that they may be destroyed by the enemy's fire while on the march, but this seems to apply equally to the acid cart or to any of the generators, except that the latter could be patched, while the tubes, which have to stand great pressure, cannot be tinkered up in any way.

Again, with the compressed gas it is necessary to keep up a supply of full tubes from the base to take the place of the empty tubes, and a pumping station must either be fitted up at the base, or a good supply of loaded tubes taken out from England. The latter plan was adopted when a balloon equipment was sent with the Bechuanaland Expedition.

As during the five years in which I have been connected with military ballooning I have been accustomed to the carriage of the gas ready made and compressed, I am no doubt prejudiced in favour of the system, but I have done my best to deal fairly with both systems.

The Balloon and Fittings.

I will next consider the question of the balloon itself. The wind is the great enemy of captive ballooning, but it is precisely captive ballooning which is most useful for military purposes. The wind tends not only to put a great strain on the materials, but the balloon requires great buoyancy to rise against it, and so a shape which

presents the least resistance to the wind is most advantageous; the cigar-shaped balloon would appear the best, with a rudder to keep it head to wind, but the great difficulty is to keep the shape of such a balloon rigid unless it is full of gas, and at present I do not know of any Power that has left the old spherical form for captive work.

In considering the material of the envelope, we come to one great disadvantage of hydrogen, which I have not mentioned before, that is, its diffusibility, which is two and a half times as great as coal gas; we therefore require a material very light, but very close in texture; that most commonly used is silk, coated with certain varnish, and this has been adopted by the French. The Germans use a cotton material coated with india rubber; we use a different material, which gives very good results, but which I am not at liberty to discuss.

With regard to the component parts of the balloon, after duly considering safety, everything else has to give way to the question of weight. I have already mentioned that the size of the normal English military balloon is 10,000 cub. feet, and, as hydrogen lifts about 65 lbs. per 1,000 cub. feet, this represents a total lift of 650 lbs.

Two very light men will weigh, say, 280 lbs.

The balloon must be able to take up at least 1,500 feet of rope, weighing, say, 100 lbs., and therefore there remains only 270 lbs. for the weight of the balloon and its fittings and for the buoyancy required to make it rise and withstand the force of the wind.

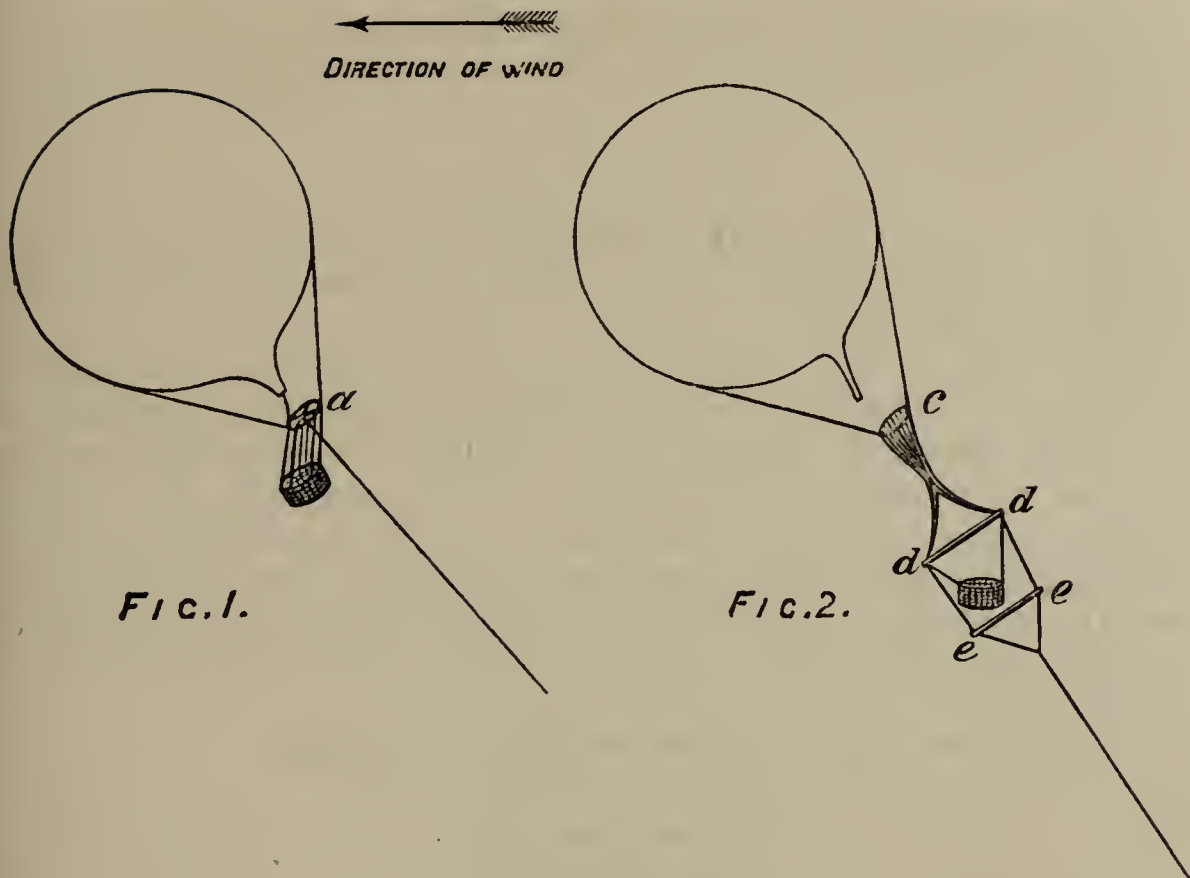
I do not think it is advisable to go into the detail of the various parts of the balloon, such as the valve, hoop, net, &c., but for the benefit of those who may be anxious to know what accommodation is provided for the aeronauts, I will mention that the car is made of wicker work, and weighs about 20 lbs.; it is provided with two small seats, and is $3\frac{1}{2}$ feet long, $2\frac{1}{2}$ feet broad, and $2\frac{1}{2}$ feet deep, which cannot be said to err on the side of luxury.

The balloon when packed fits with its net and most of the fittings into the car.

There is one point of detail which I will go into, as it has a certain amount of bearing on the comfort of the aeronaut, and so affects the accuracy of his observations; it is also a marked difference between some foreign equipments and our own: I allude to the method of connecting up the car and the captive rope to the balloon.

Fig. 1 shows the method of attachment used by us, Fig. 2 that used by the French.

In Fig. 1 the net comes down to a hoop, *a*, and the car is suspended from the hoop by six car lines of sufficient length to give plenty of head room from the hoop to the bottom of the car. The captive rope is attached to an eye just below the centre of the hoop. In Fig. 2 the net lines are brought down to a small hoop at *c*, and thence down to the extremities of a trapeze, *d*, from which the car is suspended: a second trapeze, *e*, connected with the first trapeze, swings below the car, and the captive rope is connected to it. The advantages claimed for the French method are that when the balloon is deflected from the vertical position the movement is not transmitted to the car so much as in our method, and also that the captive rope



is clear of the observers. I have no personal knowledge of the system, but the drawbacks to it appear to be increase of weight and the difficulty of reaching the balloon from the car.

In the English method the aeronaut can easily get from the car through the hoop to the tail or lower extremity of the balloon, and, as a matter of fact, our car is so small and cramped that when two men are making an ascent one of them usually sits on the hoop, the netting forming a comfortable hammock.

Having disposed of the gas and the balloon, the question of the captive rope arises.

As the balloon ascends, it is continually raising a great weight of rope, and at the same time losing its buoyancy owing to diminution of the barometric pressure, so that the rope must be as light as possible; it must also be strong, as it has to hold the balloon, bear the weight of the part below any point, and stand the sudden jerks of the wind; but, on the other hand, excessive strength is dangerous for the following reason: if the violence of the wind is to break anything the rope is the thing that should go first; an involuntary free run is not to be desired, especially with the wind blowing towards the enemy; but, if the captive rope holds, either the net or balloon itself tears; if the first, the balloon escapes and the remainder, including the aeronauts, falls at once to the ground; if the second, the balloon may parachute and check the rate of descent, but it is not an experiment to try often.

The rope adopted by us answers the double purpose of a guy rope and a means of communication. It is made of steel wire in seven strands, each strand consisting of twelve wires and a string core; in the centre of the rope there is an insulated wire for telephone work.

The circumference is $\frac{7}{8}$ inch, and breaking strain 1 ton; the weight is rather over 1 oz. per foot. The wire itself acts as the return wire for the telephone.

Balloon Section.

Having now discussed the principal points to be dealt with in designing a balloon equipment, I will go on to the position of affairs at present in the Army.

For many years training in balloon work was done in the summer at Lidsing, near Chatham, but the Officer in charge of balloons was the only recognized balloonist; the Subalterns were posted to dépôt companies at Chatham, and lent in the summer, and the men also belonged to dépôt companies, so that, except for three or four months in the summer, the Officers and men were scattered. However, on April 1, 1890, the formation of a balloon dépôt and section was sanctioned, and the numbers were as follows:—

Balloon Dépôt.—1 Instructor in ballooning.
 1 Military mechanist.
 1 Engineer clerk.
 6 Other ranks.

Balloon Section.—1 Captain.
 2 Lieutenants.
 1 Company sergeant-major.
 1 Sergeant.
 23 Other ranks.

The transport of the section consists of six wagons, each requiring four horses. They comprise—

1 Balloon wagon.
 4 Tube wagons.
 1 General service wagon.

All these wagons are converted from general service wagons to avoid special fittings as much as possible.

The balloon wagon carries at the tail of the wagon a drum on which is wound 2,500 feet of wire rope; the drum is fitted with a strong brake, and with handles at each side for winding in the rope; the telephone connections are carried from the drum to a box in which are the telephones. The rope runs from the drum through a pulley, which, by means of a ball and socket joint, follows any movement of the balloon. This joint is connected to a screw shaft which causes it to travel from one end of the drum to the other, and ensures the rope being evenly distributed. There are two boxes in the middle and front of the wagon which carry ropes and all the necessary small stores; these boxes when closed serve as seats for the men carried on the wagon. The balloon packed in its car fits between the two boxes.

The balloon wagon in foreign equipments carries a small vertical

engine, and the rope is run off or wound up by machinery, this makes the wagon very heavy, and we find that steam power is not necessary.

Our balloon wagon can carry twelve men if required.

The tube wagons carry the supply of gas for the balloon. The tubes are made of mild steel; they are 8 feet long, $5\frac{3}{8}$ inches in diameter, and $\frac{1}{8}$ inch thick; their cubic capacity is 1 cub. foot, and they are loaded in peace-time at a pressure of 1,500 lbs. to the square inch or 100 atmospheres, so that each tube carries 100 cub. feet of gas. In war-time the pressure is increased to 1,800 lbs. or 120 atmospheres, and each tube carries 120 feet of gas. The average weight of a tube is 70 lbs.

Each tube wagon carries 35 tubes; they are arranged longitudinally in five rows with the nozzles pointing to the rear, and are connected up to a wooden chest lined with copper, into which the gas passes, and is then carried to the balloon by connections which are put on when required. The tubes are kept steady by light iron framework, which is unfastened when the tubes are empty and have to be unloaded. Each tube is turned on separately, and the contents of three wagons can be run into the balloon simultaneously.

The weight of a loaded wagon is 43 cwt.

To show the ease with which these tube wagons can be loaded and unloaded, I may mention that during the cavalry manœuvres last year I started from Frensham Common at 6 A.M., and took three tube wagons loaded with empty tubes to Farnham railway station, a distance of about 4 miles. The full tubes were taken from the railway trucks and loaded on the wagons, the empty tubes unloaded and placed in the trucks, and the wagons sent back to Frensham, and the balloon was filled and ready for an ascent at 9.30 A.M. The road was very hilly, and the wagons were only taken along at a moderate pace.

The tubes are in no way dependent on the tube wagons; the balloon can be filled from tubes arranged on the ground, or the tubes may be carried in ordinary carts or slung on camels or other pack animals.

Of course, it is most important to have a good valve for the tubes, and this I can safely say we have got; the outflow of gas can be regulated with the greatest nicety, and during the operations in Bechuanaland and Egypt I believe there was not a single case of leakage from the tubes. The tubes are tested before delivery by the manufacturers and afterwards periodically with a water pressure of from 2,700 to 3,000 lbs. to the square inch.

The general service wagon is of the usual pattern, and carries all the reserve stores, the most important being a spare balloon and a spare coil of the steel wire rope.

Although fully equipped with wagons, the balloon section at present possesses no horses; these during peace-time are supplied by the field depôt and other mounted units of the Royal Engineers at Aldershot.

Mobility.

The opponents of captive balloons are very fond of advancing as an argument against them that they are useless unless they are kept stationary; but this is not the case. I do not wish to damage my case by claiming too much, and will frankly admit that it is impossible to tow a balloon against a strongish wind, but in a light breeze, or with a favourable wind, a balloon has no difficulty in keeping pace with infantry, and frequently can go much faster. To judge of the mobility of a balloon by the results obtained during peace manœuvres in England is a very unfair proceeding. The climate is more against ballooning than that of most countries, the country itself is very cramped, and, greatest enemies of all, we have the laws of trespass and claims for damages to deal with.

The two great difficulties are telegraph wires and trees; for instance, in moving a balloon from the South Camp, Aldershot, to the Fox Hills, a distance of about $2\frac{1}{2}$ miles, there are two railways with wires on each side, and two other lines of wire to cross, and this is not an exceptional case.

With a side wind, high trees by the side of the road are a great trouble, as the rope gets foul in the trees. In peace one has to keep to the road for the sake of the crops, but otherwise the natural thing would be to get on the lee side of the trees, and, if necessary, keep the balloon low down under their cover. Roads where the trees meet overhead are very nearly impassable, as the rope cannot get through.

In good open country the balloon is let up on the wire rope from the wagon, and towed along at any convenient height, depending on whether the balloon is required at the time for observing purposes, and also on the fact that the force of the wind often varies at different heights. On roads where telegraph wires and trees are frequent the balloon is towed by two ropes, which can be fastened to the drum on the balloon wagon till an obstacle is reached. If this is a telegraph line or similar obstacle, the object is to hold the balloon with one rope while the other is got over the wire; if the wind is in the same direction as the line of march the aeronaut hauls up one rope clear of the wire; the balloon, held by the other rope, drifts with the wind over the wire, and the first rope is dropped over and secured. The second rope when let go swings over of itself. If the wind is against the balloon the first rope must be thrown over the wire from the ground. Plenty of practice is required to carry out these operations smartly in a wind, and I think it speaks well for the sappers in the balloon section that in three summers' work at Aldershot the only damage done was that on one occasion two wires were put in contact for ten minutes.

Communications.

It is most important to ensure prompt communication between the balloon and the ground, and this is got by using the telephone, the

wire for which runs through the main wire rope ; the distance is never much over 500 yards, and by using the Siemens-Halski patent we avoid the necessity of a battery. A very convenient method of sending messages and plans from the balloon is by aid of a small canvas bag which is weighted and provided with a split ring at one corner ; the message is put in the bag and the ring run round the rope, and the weight of the bag makes it run down the rope to the ground. When this only is used the aeronaut must arrange a code of signals to say when he wants to rise or descend or be hauled down. Communication can also be kept up by flag signalling. Whenever the telephone is not connected up and the wagon is in motion, a man should ride some distance away from the wagon. I know nothing more annoying than shouting "Halt" from the balloon at the top of one's voice while the men are all round the wagon, the noise of which prevents their hearing one.

Observation from the Balloon.

It is a very common error for people to fall into to assume that, because the balloon is a good place to reconnoitre from, that, therefore, to send good reports from a balloon is a very easy matter, and that any Staff Officer can go up in a balloon and at once be able to report what he sees to the General. I maintain, on the contrary, that nothing requires greater practice. Except on very calm days, there is always a certain amount of movement which is very trying to most untrained men and affects them either in the head or the stomach ; many a man who will be perfectly at home in the balloon on a calm day is rendered more or less incapable of sending in a good report, if there is any wind, by a feeling closely allied to sea-sickness. This motion of the balloon has also the effect of rendering it no easy matter to keep a field glass fixed on any particular object, and as the balloon should be at the least two miles away from an enemy, this is of great consequence. On making a first ascent, one of the remarks most usually made is, "Why, the country looks just like a map," and this is perfectly true, but, unfortunately, nature has omitted to mark the hill features by contours in red. As the balloon ascends the slopes gradually flatten out, and the country looks like one flat plain. The result of this is that the observer is apt to fall into the mistake of assuming that movements which are plainly seen by him are also seen by his General, and that a report of them is valueless and a waste of time, whereas the movement may be totally hidden by a fold in the ground. Or from the same cause, except to a practised observer, many very important movements lose all their significance, or may be interpreted in a totally wrong way.

To the untrained eye it is very hard to estimate numbers correctly ; a red patch two miles off is easily seen, but, unless the observer can give an estimate of the number of companies or battalions forming that red patch, the information obtained is of very little value ; he must not only be able to approximate to the numbers but also give the constitution of the force, whether cavalry, artillery, or infantry,

or all three. Thinking it over calmly, it seems ridiculous that anyone should take a company for a battalion or transport wagons for field guns, but, speaking from sad experience, I know that both mistakes can easily be made. The observer must be fully acquainted with the formations and tactics of all arms of the Service to avoid sending useless and misleading reports. Again, with our small balloons, it is frequently necessary in windy weather to only send up one man at a time, in order to give the balloon greater buoyancy to rise through the wind; the observer must, therefore, have some practical knowledge of the balloon in case of accident. Nothing sounds easier than to say, "If you break away, pull your valve line to come down, or throw out ballast if you want to rise," but regulating this wants a considerable amount of practice; there is something very strange in floating quietly or being pitched about in space when alone for the first time, and to an inexperienced man the sudden jar caused by the balloon wagon going into a deep rut, or turning a corner too sharply, or from many other causes, may shake his nerves at a time when he particularly requires to be cool and collected. I have said that as the balloon ascends the country flattens out, but in parts where the hills are very steep and the valleys deep there are bound to be bits of hidden ground which the balloon cannot search, and in summer troops may lie concealed in woods for some time without their presence being noticed before they open fire; the only thing to do is to carefully watch these places for the first sign of any movement.

For a report of an enemy's movements to be of use it must arrive in time for his opponent to be able to take steps to meet the emergency; the report must, therefore, be put as concisely as possible, and the time at which the message is written must be stated; a rough sketch, showing troops with coloured chalks, is frequently much more useful and quicker done than any message, but it has the disadvantage that it cannot be sent to the General except by a messenger.

Arrangements must be made for the quick transmission of reports from the balloon wagon; these can be sent very quickly if a cable cart of the telegraph battalion is available; if not, mounted orderlies have to be used.

The Use of Balloons in War.

Balloons have not yet been used in a big war since they have been properly organized, and we shall be able to gain much information as to the correct way of using them when they have been given a fair trial.

The use of balloons at field days and peace manœuvres near Aldershot during the last three years has been a great advance on the old system of training at Lidsing, where the Officers and men were taught the management of the balloon in all weathers, but never had the opportunity of watching any forces manœuvring. I have already mentioned how hard it is for Officers unaccustomed to the work to send in good reports, and it is not surprising that, at the end of the first summer's training at Aldershot, the reports were considered un-

satisfactory, while the balloon working was reported as good. But though peace manœuvres are excellent training for the balloon observers, and do, to a certain extent, show to a General the capabilities of a balloon, I maintain that the results so obtained cannot be taken as a fair criterion of their usefulness. On active service the troops, when nearly in contact, have always to be on the alert, and it is at this period that the balloon will be specially valuable; a balloon is nothing but a scout, a means of obtaining information which may assist a General in forming his plans, and in every case in which the balloon has been utilized in this way the criticisms have been favourable; when a general action commences events follow each other in such rapid sequence that it is extremely difficult to send the information from the balloon in time for it to be of use unless very large forces are engaged; turning movements can and ought to be seen in time to be met; but, until I am convinced to the contrary by facts, I maintain that the great use of balloons in the field is in supplying information as to the disposition of the enemy's force before the engagement commences, and giving details as to the position of his camp. In peace manœuvres this cannot be fairly illustrated owing to the limits of time and space. On an ordinary field day orders are usually issued that troops are not to cross certain boundaries before a certain time, and the balloon is not allowed to ascend before that time; therefore the balloon goes up for the first time when the occasion on which it would be most useful has passed.

For instance, an attacking force has to advance at 9 A.M., and at this time the balloon is sent up with orders to report what force is occupying the woods in front of it, but by this time the defending force has occupied the woods, and is hidden from the balloon; a few men may expose themselves here and there, and the strength of the reserve in rear of the woods gives a clue to the numbers in the wood; but on active service the balloon would have been up hours before, watching the enemy occupying the woods, and accounting for every man. The only report that the aeronaut can send is that the woods are occupied, but he cannot tell the strength of the force, and therefore the report is practically useless. But, on the other hand, if the balloon were able to give this information, the field day might be checked at the very commencement.

I will give another instance: on one occasion the balloon was with the attacking force, and made the first ascent when the troops began the move; a regiment of cavalry advanced across the neutral line, and was promptly charged in flank and came under the fire of a machine-gun; the General directing the attack was close to the balloon, but it was impossible to warn the regiment. On active service the balloon should have given notice of this defending force at least half an hour beforehand.

As an example of the use of a balloon in watching an enemy, I will quote two instances: in the first, a fight took place in the morning between a flying column and a force from Aldershot; the flying column then encamped, and the balloon was left to watch them at a respectful distance protected by a battalion of infantry. The balloon

was connected with Aldershot by the T.B., R.E., and a report of the enemy's outposts sent in, which enabled a cavalry force in the night time to avoid all the outposts and get right into the middle of the camp.

Again, in the summer of 1890, a column was encamped on Puttenham Common, and the balloon from a distance of $1\frac{1}{2}$ miles, and assisted by a squadron of cavalry, sent in an accurate sketch of the enemy's camp and the disposition of all his outposts, particularizing the regiments furnishing them as they differed considerably in uniform.

That during the fight itself the balloon may be of the greatest service when large bodies of troops are engaged is undoubtedly true, and is borne out by the fact that, during the last French manœuvres, General Gallifet, who commanded one side, remained in the balloon the whole time, and sent orders down to his Staff by telephone; nothing is said in the various accounts as to the strength of the wind, and we may assume that in this case it was a calm day.

Turning from the subject of field operations, I have usually found that even the opponents of ballooning allow that a balloon may be of the greatest assistance in correcting artillery fire, describing its effects, and giving particulars as to the construction of the various works, constructed or being constructed. In such cases every day something is going on, and even in unfavourable weather the balloon is bound to get a chance sooner or later. Here again the only practice that can be got in peace-time is carried out under circumstances which are very unfavourable to a balloon. For several years in succession the balloon section has been sent to Lydd for the artillery experiments; in the last two years the section went, at the close of the Aldershot manœuvres, and arrived just before the time of the equinoctial gales. I may mention, in case some of my audience have not visited it, that Lydd is close to Dungeness, and the ranges consist of a long expanse of shingle; it is exposed to every wind that blows, and a calm day is of very rare occurrence. The batteries are for the most part made of shingle, and harmonize completely with the surroundings, and there are absolutely no points to assist one in forming any idea of distance.

Usually we have drawn up a table giving the position of each round as observed by the balloon, the range party, and any system that may be on trial at the time; it is useless to imagine that at a distance of 2 miles or more observations from the balloon can hope to be as correct as those taken by the aid of theodolites; but with practice a very fair estimate can be made, and the large errors are always found when the shooting is erratic. These observations have always been taken when only one gun has been firing, and I think that when several batteries are employed any system depending on two separate observations would be very liable to go astray. Lastly, the balloon has the great advantage that, though the observer may give the position of a round as 50 feet over instead of 25 feet over, he can always describe the effect of a round fully and accurately, unless the slopes be very steep, in which case part of the interior of the work may be hidden.

If a battery is firing at an unseen target, the system of observing fire by any means but a balloon would be impossible in many cases. I have not hitherto alluded to the moral effect of the balloon, but, in some cases, it is very great. A balloon up in the air, however far off it may be, is still a conspicuous object, and many a man seeing the balloon is convinced that he himself is of necessity seen by it, and, therefore, he will not venture anywhere near. An instance of this occurred during the Aldershot manœuvres in the summer of 1890. The balloon was attached to a flying column encamped at Frensham; there had been a fight in the morning, and further operations during the day were unlikely; but, as it was very calm, a great many Officers made ascents during the afternoon. As it happened, cavalry scouts had been sent out from Aldershot to gain information; but on returning reported that they had not been able to get near on account of the balloon. These scouts were among the trees and houses, and were never discovered by the observers in the balloon.

The question of background is a very important one; the rifles are terribly hard to distinguish against the dark green of the pines; while they are very prominent if manœuvring on sandy soil like the Long Valley at Aldershot; red shows up fairly well, except on a few occasions; but the white shell jackets of the Guards or Highlanders are by far the most conspicuous.

The Effect of Fire on Balloons.

The mention of Lydd brings us naturally to the subject of the effect of fire on balloons, as it is at Lydd that all the experiments have been made. Here again we are prevented from drawing any sound conclusions, from the fact that the experiments vary so very much from service conditions. I will briefly describe the last experiment at which I was present. It was a very calm day, and the balloon was anchored on the sea shore at about 4,000 yards from the battery, it was fired at by one 13-pr. field gun, and the balloonists were sheltered in two splinter proofs. The balloon was let up on the wire rope from one splinter proof, and to this rope, at a distance of about 700 feet from the balloon, another rope was attached, and the end taken to the second splinter proof. The only means of altering the position of the balloon was by letting it up or down on the wire rope and hauling on or paying off on the subsidiary rope. The car of the balloon was weighted with sandbags, &c., equal to the weight of two men. The result of the experiment was, that it was not hit until the seventeenth shot; while falling it was again struck by another round of shrapnel, but fell quite slowly, and there would have been no appreciable shock. The damage done consisted of two tears from fragments of shell and various bullet holes through the envelope, and the car had two bullet holes through it. The balloon could have been rendered fit for use again in about two hours.

But I may venture to state that on service the experiment would be very different; the fire of at least one battery of artillery would be

concentrated on the balloon, and by varying the range and elevation of the different guns the dangerous zone would be very largely increased. On the other hand, if a balloon were being fired at, it would be let up from the wagon, and the latter kept in motion; the elevation would also be frequently varied. In the experiment alluded to it was only possible to vary the position slightly, as the men were not allowed to leave the splinter proofs, although so great was their interest in the experiment that they repeatedly asked to be allowed to do so.

A balloon should never be allowed, if possible, within the effective range of infantry fire, and taking all things into consideration, it appears that about 2 miles is the minimum distance at which it should be kept from artillery; one great point in the balloon's favour is the difficulty of getting its range, and to avoid any assistance being given, the balloon wagon should always be well under cover.

The effect of a hole or tear in the balloon depends greatly on its position; the gas having a tendency to rise, a hole below the great circle is not nearly so dangerous as a hole near the crown or top of the balloon; a few bullet holes would cause a certain amount of leakage, but could easily be stopped, but what the moral effect on the aeronaut would be when the shooting got so close I am unable to say. If there is much wind the balloon is likely to rip if a tear, such as a fragment of shrapnel would make, is started, and special precautions are necessary to check this.

Free Ballooning.

I have up to now only dealt with the question of captive ballooning, as it is by far the most important from a military point of view, but the military balloonist must also be trained to take charge of a free balloon—the siege of Paris affords many instances of how they can be utilized in war; but, besides the voluntary free run for taking out despatches from a besieged city, or some similar purpose, there is the involuntary free run which may happen from the breaking of the guy rope, either by a fragment of shell or by accident. In the latter case there would be no warning and the balloon would ascend very rapidly, as it would be suddenly relieved from the weight of part of the guy rope, and the aeronaut would have to act promptly if he wished to be of any further use to his side; for safety, the grapnel and rope and a little ballast should always be taken in the car of a captive balloon, ready for use in case of emergency.

In the case of a voluntary free run it would generally be necessary to travel a considerable distance to avoid being captured on landing; the limit of the run is reached when the ballast is expended, and practice is required to know the exact amount to use, so as not to waste any. The cost of hydrogen is against its use for frequent free trips, but I consider that in peace-time all the men in the balloon section should be taken as often as possible in larger balloons filled with coal gas.

Military Ballooning in Foreign Armies.

It is very difficult to get useful information about the equipment in other armies; the occasional paragraphs in the newspapers are unreliable, but I have a few facts which may be of interest.

France.

The following information is taken from "La Revue des Deux Mondes":—

"The balloon park is divided into two sections; the first comprises the balloon wagon and the tube wagons, which give to the balloonists a mobility equal to that of the troops on the march, and a supply of gas sufficient to fill the balloon three times.

"The second section comprises a small, movable gasworks, for making the gas in the rear, and compressing it into the tubes; it thus acts as a feeder for the first section.

"The process of filling takes from fifteen to twenty minutes. During the French Manœuvres in 1891, the French General Gallifet, at the battle of Colombey, remained in the balloon for about three hours watching the movements of the 5th and 6th Army Corps, and giving his orders by telephone to the ground, from whence they were transmitted by telegraph to the various staffs."

The chief feature to note in this report is that the French seem to have definitely adopted the system of compressed gas in tubes, according to the English plan.

The balloon wagon has a small vertical engine for paying out or taking in the wire rope, and weighs over $2\frac{1}{2}$ tons, and with the old plan of making the gas on the spot the generating wagons were much heavier.

In the early part of 1884, a balloon equipment that did not require transport wagons was hastily improvised and sent to Tonkin. It was commanded by Captain Aron and consisted of 1 Lieutenant, 5 Sous-Officers, and 21 non-commissioned officers and sappers; 30 marine artillerymen were afterwards attached. The equipment was packed in cases which could be carried by two or four coolies, and when the force went up the river it was carried in two junks, the balloon and stores on one, and the gas-making apparatus on the other.

The country was very much against towing the balloon, and high winds compelled it to be emptied on two occasions, but the section kept with the force the whole time, and the balloon rendered valuable assistance in correcting the artillery fire and reporting the movements of the enemy. The General himself went up and reconnoitred the town of Hong Hoa.

Germany.

The balloon section consists of—

- 1 Captain.
- 3 Subalterns.
- 50 Other ranks.

It is attached for administrative purposes to the railway brigade of the Engineers.

The balloon barracks and depôt are in one establishment to allow of the men being close to their work. The balloon used for ordinary work has a cubic capacity of 380 cubic metres or 13,400 feet, but larger balloons are sometimes used; the material for the envelope is cambric coated with india rubber.

Balloons made of the same material as the English ones are under trial, but are not yet adopted; the attachment of the car and rope is the same as ours, and having tried both methods, they prefer it to the French method. Steel tubes supplied by Delmard and Son, who make for the English Government, have been experimented with, but the result is not yet known; at present the gas is made in a traveling generator which weighs about 3 tons. Zinc-dust mixed with hydrate of lime and formed into cartridges is placed in a furnace and subjected to a high temperature, and hydrogen is given off. About 1 lb. of the mixture gives 2 lbs. of hydrogen.

The wagon equipment consists of—

- 1 Wire wagon,
- 2 Gas generating wagons,
- 3 Wagons with the balloon and gear,

and in the field of 5 wagons with material for gas-making.

Constant practice is carried on all the year round, and a good deal of coal gas is used in larger balloons to save the cost of hydrogen. The men are frequently taken for free trips. The training and use of the balloons are left entirely to the Officer Commanding balloon section, who is personally responsible that everything is in order when required for peace manœuvres or active service.

A balloon section has also recently been started in Bavaria.

Russia.

In 1890 there was formed in Russia a balloon park, and in 1891 a fortress balloon section. From these will be furnished the field balloon parks. Both belong to the Engineers and are under the Inspector of electrical matters.

The instructional balloon park trains Officers and men, carries out experiments, takes charge of all stores, and on mobilization forms field parks. Its establishment is 1 Lieutenant-Colonel, 2 Senior Officers, 1 Adjutant, 2 Junior Officers, and 71 other ranks. In war-time this is increased by 8 Junior Officers and about 100 men.

Each year 4 Engineer Officers and 4 Officers from the fortress troops are attached for instruction. *Fortress balloon sections* will be formed as required. Each one forms in war three detachments, of which the establishment is:—

Peace Establishment.—1 Captain, 2 Subalterns, 44 other ranks, besides non-combatants.

War Establishment.—1 Captain, 4 Subalterns, 115 other ranks, besides 21 non-combatants. The 1st fortress section was, I believe, formed at Warsaw, and another is to be formed this year.

Italy.

The Italians in Abyssinia employed a balloon equipment closely modelled on ours, but they are now, I believe, trying balloons supplied by Yon, of Paris.

Conclusion.

In conclusion, I can only state that, although we have succeeded in obtaining a good portable balloon equipment, and can say that we have been the pioneers of the compressed gas system, there is still much room for improvement. The manufacture of steel is always advancing, and I hope before long that we shall be further able to economize in weight in proportion to the amount of gas carried. But, besides this, it is necessary to have a constant supply of Officers and men trained in balloon work so as to get the best possible results, and this training must take place somewhere where the management of the balloon and observation from the balloon can be combined. I have not touched on the subject of steerable balloons, as they are still in the future, and, when discovered, will render all the matter in this lecture ancient history.

Major BERESFORD: The telegraph has been mentioned in connection with the balloon, and I think that it would have a very close connection with it upon the battle-field. We may say that the telegraph would be the errand-boy of the balloon, and I hope I do not insult the lecturer by suggesting that the balloon itself would form an excellent sign-post for the telegraph. My idea is that the foot of the balloon should be the centre for intelligence, you might say the telegraph exchange, and that by means of cable carts, radial lines should be laid in any direction that might be found necessary. For instance, a line to the nearest permanent telegraph station, and another to follow the General about the field (unless he chose to take General Gallifet's example, and remain in the balloon). It is always very important to know the whereabouts of the General, and to be able to communicate with him with the least possible delay. Anyone who wished to send or gain information, to ask for reinforcements, or to accomplish any of the objects for which communication is wanted, would, if they had not a field telegraph office close at hand, go to the balloon, where, I hope, they would find all the necessary means for getting into communication with the General, or with any other important point.

Captain HEATHORN (late R.A.): I should like to ask two questions. When the gas is released from the tube, is there any difference in temperature, is cold generated? Because we know that when compressed air is released, the vapour round about the valve soon becomes ice. I should also like to be informed whether any progress has been made in the navigation or the movement of balloons, either stationary or destined to travel about.

Colonel T. FRASER, R.E.: I think it would be interesting if the lecturer would tell us at what distance General Gallifet was from the artillery of the opposing force, at what distance he was allowed to remain in the balloon, by the French Umpire Staff on the occasion he mentioned. That would give us a clue as to what is the opinion of the French Army on the subject.

Colonel Sir ARTHUR MACKWORTH, R.E.: There is one aspect of ballooning I have not heard touched upon yet, and that is the use of balloons at night. Of course in the daytime, as the lecturer has told us, there are great difficulties for the aeronaut in recognizing the features of the country. As he said, the features are not shown by red contours; but at night I think the use of the balloon might be very great in discovering the approach of small parties of the enemy if there were some means of showing up the country from the balloon. I do not suppose it is practicable—I speak diffidently—at present, to use the electric light, but there

is a form of parachute light ball, which is now, I believe, almost obsolete, known as Boxer's¹ parachute light ball. It was fired from mortars, and I think that it would be found useful if thrown from the balloon over that part of the country where it was expected that small parties of the enemy were approaching. The parachute would slowly descend and burn for a few minutes at all events, and so give time for the observers in the balloon to report the movements of the enemy.

Major WATSON, C.M.G., R.E.: I should like to say a few words, as, not long ago, I had the opportunity of seeing something of German military ballooning. I was much struck with the practical way in which they worked, but, at the same time must agree with the lecturer that our field equipment is lighter, and more useful for rapid movement. The German equipment, consisting as it does of a heavy wire wagon, and also a very heavy apparatus for generating the gas, cannot compare for facility of movement with that adopted into the English Service. On the other hand, I think the Germans are ahead of us in the practical use to which they put their balloons, and the constant training which they give their Officers and men at all times of the year: even in winter when the snow is on the ground they always have the balloon out, and regard it as a very important matter to train their aeronauts to observe, not only in the summer months, but in winter, at night, and, in fact, under all the conditions of active service. In order to do this, they not only use the light hydrogen balloons, but larger balloons which are filled with coal gas, hydrogen being a very expensive gas, whereas coal gas can be obtained at a much lower price. The Germans consider it very necessary to train all their men in free work, as a man cannot make a good aeronaut unless thoroughly at home in the car and thoroughly prepared to go away free if it is necessary. There was one important point to which the lecturer alluded slightly, and that was the necessity of having the Officers well trained in observing. I know that some people think that any Staff Officer can go up and send down information, but to my mind it would be much the same thing as sending out a Staff Officer to reconnoitre who had never been on horseback before. I do not think that Staff Officer would bring much useful information back. And in the same way it is only those who have been frequently up in the car of the balloon, and know what it is like under various circumstances, who can realize how very different the aspect of everything is when seen from a height of 2,000 feet to what it is from a moderate height, such as in the field observatory. I do not think much need be done in the way of navigable balloons at present, although there is no doubt that in time they may be brought to perfection. For the moment I think there is plenty to do in getting the best use out of what I believe is, at present, the best portable equipment which is employed for military ballooning.

The CHAIRMAN: Before the lecturer replies, there are one or two questions I should like to ask. One is with regard to distances. I notice it was stated that a balloon, to be safe, should be at least 2 miles from possible artillery which might fire upon it, but the lecturer has not told us one very important thing, namely, how far he thinks the observer in a balloon can see, what amount of ground can be covered by him. I am quite sure what Major Watson says is perfectly true: if the balloonist observes at all, he must be exceedingly well practised in observing from a balloon. I should be rather inclined to doubt, considering how very movable the platform is, if any man could see much more than 4 miles, if so far. The other point which the lecturer has hardly emphasised as fully as I should like, is, whether we are not getting too light an equipment for our balloons. It seems to me, we have got almost the smallest margin we possibly can have between the amount we can carry, and the amount we want to carry. It is all very well to have the lightest and most mobile equipment, but I would ask the lecturer to show why it is necessary to have such a very mobile equipment. The very fact of the command one gets from a balloon would seem to point that it can be sent up from the most convenient place, and as long as it is tolerably mobile, and can be got along any road upon an ordinary baggage wagon, I should have thought a larger balloon, and, if possible, a gas-generating machine which would be available two

¹ Colonel Boxer, R.A.—ED.

or three times over, and not like these tubes, have to go back to be filled up, would be preferable. Such an arrangement, I think, would be more serviceable in the long run than a very light equipment that will fill the balloon once, but once the balloon is filled, it must be left full always, or else the tube must be sent back to be refilled. On those points I think information would be a very good thing.

Lieutenant H. B. JONES, R.E., in reply, said: The first question I have been asked is, whether the temperature is much lowered when the gas is run out from the tubes. In answer to that, I can say that it is very much lowered; if, in opening the tube valve, the gas is allowed to run out at its full pressure, the orifice is frequently choked, the gas freezes, and will not run out until it has had time to thaw. With reference to the question as to the progress of steerable balloons, I am afraid I cannot give any very useful information. At present we have not been able to go into the subject much, and although we know that some foreign nations and private individuals are devoting themselves to it, they are naturally not inclined to give any information to outsiders, and what I have got I cannot repeat with any certainty as to its accuracy. It was not stated in the papers which I saw what distance the French balloon at the last manoeuvres was kept from the artillery of the opposing force. As regards the question as to what distance an observer can see from the balloon, it is naturally a matter which varies very much with the conditions of the atmosphere and the nature of the ground. I am informed by Captain Trollope that in Bechuanaland, with the balloon at an altitude of 1,000 feet, the range of vision was about 10 to 12 miles. In England I should judge it to be considerably less, but large bodies of troops ought to be visible on clear days at a distance of 7 or 8 miles. Lastly, I have to answer the question "whether we are not cutting down the weights too much, and trying to make the balloon equipment too light." I agree that it would perhaps be better to have a larger balloon because it has more buoyancy with which to fight against the action of the wind, and I think it is only a question of time; an improved pattern of a lighter tube will provide a means of carrying gas for a larger balloon without increasing the weight. I do not consider that a portable generator is as good as the tube system. To begin with, I have already mentioned in my lecture, the gas takes a long time to make, and the various operations of cooling, washing, and purifying the gas require a large quantity of water which might not always be available. When the tubes are empty, they have to be sent back to the base to be again loaded, but materials for making the gas on the spot have to be sent up from the base in a similar manner, and the acid is very difficult to convey. Referring to the beginning of my lecture, in which I have taken 17,000 cubic feet of gas as the standard of comparison, the weight of the tubes is $4\frac{1}{2}$ tons, that of the material for the zinc process $2\frac{1}{2}$ tons, and for the iron process $4\frac{1}{2}$ tons, so that there is not much difference in the weight that has to be sent from the base to the front. With the tube system there is no other weight to be transported to the front, but in the second system, the generator and other apparatus must be carried.

The CHAIRMAN: This is practically a new subject, and there can be no greater advantage than to ventilate a subject of this sort that is full of potentialities, most of which are perhaps scarcely thought out, in the theatre of this Institution. I had hoped that the gallant Admiral I see opposite me would have told us something about the possibility of using balloons from ships. I know it is held by some people, that for purposes of watching blockading vessels, and that sort of thing, balloons will be found very useful, and that with their field of vision it will be much easier to pick up a ship at sea than pick up troops amongst the lanes and roads of a woody country. However that may be, I hope that the idea which Major Watson suggested will not be lost sight of, namely, that every man who is practised in going up in balloons should be not only a skilled observer from a captive balloon, but should be a trained aeronaut, and able to take a journey independently, when the balloon is not held captive by a rope. I hope, therefore, that our balloon section will not only practise with hydrogen gas, but will also have larger balloons, and practise cruising about the country. I am sure that in that way, and that way alone, shall we be able to get men who are properly trained and who have sufficient experience and nerve. I now have to ask you to thank Mr. Jones for his very interesting lecture.



Friday, February 12, 1892.

ADMIRAL SIR J. E. COMMEREELL, *¶.C.*, G.C.B., in the Chair.

THE TRAINING OF OUR SEAMEN.

By Vice-Admiral the Honourable Sir EDMUND R. FREMANTLE,
K.C.B., C.M.G.

“THE training of our seamen” is my theme, and, if I may judge by the lectures which have been given here, as well as by recent articles in the “United Service Magazine,” from the pen of Officers of distinction, it is a subject of very general interest at the present time, when a change, which has been in progress for the last fifty years in the Fleet, by the substitution of steamers for sailing ships, is approaching its inevitable conclusion; our men-of-war being now all but universally mastless and sailless steamers, dependent upon machinery alone for their means of locomotion.

The present importance of the subject is, then, my reason for taking it up, and not because I have any fad or hobby of my own; it is probable that I can say little that is new, but I trust that I may say much that is true, and which will be acknowledged as such by my brother Officers. In my view, the principal writers and lecturers who have dealt with the training of our seamen have lived far too much in the region of sentiment, and have seldom condescended to look facts in the face, so that their contributions, however interesting, have had a reactionary tendency, and this, I think, is unfortunate. But I propose dealing with the views of others more fully later; it is more to the purpose at present to explain my own standpoint, which is simply that, while I yield to none in my respect and reverence for our old naval heroes—and the conditions under which they developed their seamanlike skill are an interesting study—I consider that the path of wisdom is rather to look forward than backward, that there is neither manliness nor profit to be gained by “crying over spilt milk,” and recognizing that “The old order changeth, yielding place to new,” it is our duty to endeavour, in the training of our seamen, to adapt them to their environment.

Intimately connected with the subject of training is that of numbers and organization.

It is obvious, for instance, that, if we require more boys or men in future, the system of entry and training must be altered or modified, while the question of the organization of our ships’ com-

panies is, to a great extent, the further training of our men-of-war's men after they have left the training ships, and cannot, therefore, be overlooked; my subject, accordingly, divides itself into three heads:—

- I. Numbers required for peace and war service.
- II. Organization.
- III. Early training.

The latter is, of course, the important point, and the one with which I propose specially to deal; but for the reasons given above it cannot be dissociated from the other two, on which it, in great part, depends; if, however, it is objected that my proposals with regard to numbers and organization are somewhat sketchy, it should be remembered that I am only dealing with them incidentally, and as a frame to my views on training.

Let us now look into the question of our available personnel. Have we an active and reserve force sufficient to enable us to man all our ships, mercantile auxiliaries included, in case of a maritime war? Shall we be able to do so in 1894, when the ships to be provided under the Naval Defence Act are completed?

Before answering this question I should like to say that I am no alarmist, and that my theory always has been, and is still, that the modern man-of-war being a complicated machine, highly trained Officers and men are absolutely necessary, so that I should aim at having our first line thoroughly efficient, and that I should consider a large and generally inefficient reserve to be neither necessary nor desirable.

Given, I thought, a war well begun by ships properly manned and disciplined, and as the war proceeded the gaps would be filled by volunteers from the merchant service and men with a predilection for a sea life, and I called to mind how our Navy had increased in the great French war from a total of 45,000¹ men in 1793 to 140,000¹ in the later years of the war, and how, in more recent times, the American Navy, which had only numbered 7,600² in 1861, with 1,457 Officers of all grades, in 1865 numbered 51,500 seamen with 7,600³ Officers, curiously enough the exact number of the seamen four years previously.

These considerations are consolatory, but there is the reverse of the medal. The seamen-gunners and torpedoists we now require cannot be recruited from the mercantile marine, as seamen could formerly, and the Americans had no navy to oppose them, whilst other maritime nations have now much better organized reserves than they had 100 years ago, so that I propose to shortly examine the numbers composing our present force, reserves included, and to see whether there are reasonable grounds for considering it insufficient.

This is not the place for going into details, especially with regard to Officers; but, lest it should be supposed that I have overlooked

¹ James, "Naval History," vols. i and vi.

² Professor Soley, in "Battles and Leaders of the Civil War."

³ Admiral Porter, "History of American Civil War."

this part of the question, I say at once that I do not share the views of those who complain bitterly of the dearth of Lieutenants, even advocating a large increase of their numbers with a corresponding addition to the half-pay list, my reasons being that it is most important that all our Officers on the active list should be kept efficient by constant service; that no other Power has any such reserve of naval Officers—France especially having but a bare sufficiency for peace service; and that we have in the Officers of the Royal Naval Reserve a most useful body of men, numbering, according to Mr. Forwood, “758¹ in 1891, 86 of whom had served, or were serving, their twelve months in men-of-war.”

In my view, the first demand of a great naval war would be for younger and more active Officers, and I would point out that in the American Civil War one of the first steps taken by Congress was to retire many of the older Officers and to pass a law by which “Commanders became Admirals by a single step, and junior Officers became First Lieutenants of ships in which they were serving as Midshipmen.”²

Leaving the Officers, then, let us turn to the men, and let us look at the numbers in the Estimates for 1891–92.

These Estimates show an active force of 71,000 Officers and men, of whom, in round numbers, 2,000 are pensioners or borne for shore service, 4,000 are Coastguard, 14,000 are Marines, 7,000 are boys, 4,000 Officers, and the remainder, or less than 40,000, are petty officers and seamen, under which heading stokers are included.

If we continue our investigations to the next page we shall find our Reserves stated at 26,568, of whom, in round numbers, 21,500 belong to the Royal Naval Reserve, 845 being Officers, 3,000 are seamen and marine pensioners, and 2,000 are Royal Naval Artillery Volunteers, making, with the 71,000 of the active force, a respectable total of 97,548; but from this must be deducted the 2,000 Royal Naval Artillery Volunteers, whom the Admiralty have handed over to the Army, the country being unable to find a place for them among its naval defenders! Making this deduction, we have, in round numbers, a total of 95,500, while France has, according to our veteran Admiral of the Fleet Sir Thomas Symonds, even deducting the *Infanterie de Marine*, a total of nearly 158,000. But this is not all. Our present Royal Naval Reserve has never been called out, and both its available numbers and the individual value of the seamen of which it is composed, as men-of-war's men, are somewhat problematical.

I am myself a believer in the Royal Naval Reserve—that is, I think better of them than most naval Officers—though I consider that they would prove of most value when serving in the mercantile cruisers, which are the ships that many of them would be familiar with; but two facts must always be remembered in connection with the Royal Naval Reserve. The first is, that the number of stokers or firemen in the force is infinitesimal, and the second is, that, practically, we cannot

¹ Mr. Forwood, speech at Liverpool, in “Times,” 13th January, 1892; the Estimates give the number as 845.

² Professor Soley, “The Blockade and the Cruisers.”

increase their number beyond that at which it stands at present. Mr. Forwood,¹ indeed, estimates that it might be increased by 10,000 men; but in the same speech he tells us that, in spite of three-quarters of a million increase in the tonnage of the British mercantile marine in the last fifteen years, the number of British seamen has diminished by 20,000. Practically, then, our only reserve is of doubtful value, and cannot be increased, while we have no reserve at all of stokers.

In our active force, Vote A, we have, it is true, our 4,000 Coast-guard, the Marines on shore, and men in harbour and gunnery ships, but these would certainly not be more than sufficient to man all our available ships, even at the present time, and in 1894 we should be unable to do so, though the Admiralty are preparing, to some extent, to meet the difficulty by increasing the entries of boys. No doubt some of the Royal Naval Reserve would be available, though I omit them from my calculation for the reasons above given.

We are then forced to the conclusion that our present system does not give us a force large enough for our requirements, and that, admirable as it is in many ways, some change is necessary. This is the universal opinion of naval Officers; the quality of our present active force is admirable, but it is inexpansive; its quantity is insufficient, and our reserves are inadequate.

Sir Thomas Symonds,² in a recent letter to the "Times," speaks strongly on the point, quoting the opinions of Lord Alcester, Admiral de Horsey, Sir A. Ryder, and Sir A. Phillimore in support of his views. It is true that these opinions were given in 1884, but, if they were correct then, they are, *a fortiori*, held now that the matériel of our Navy has been so greatly increased.

Admiral of the Fleet Sir Geoffrey Hornby is still more explicit on the same subject, his second article on "The War Training of the Navy," in the September number of the "United Service Magazine," last year, beginning with the following words:—

"In view of the considerable increase of matériel that the Fleet will receive two years hence, and the large additions that will assuredly be required so long as the activity of the mercantile marine continues to increase at its present rate, it may be well to consider how the personnel to man and form a reserve for that fleet is gathered and trained.

"The mercantile marine can give good Officers for such a reserve, but it can no longer give the goodly supply of seamen that constituted the naval strength of the country so long as the Navigation Laws were in force."

"The 34,400³ petty officers and seamen of the Navy and the 24,500 that are promised on paper from the Coastguard and Royal Naval Reserve are small numbers wherewith to meet the waste that a war must cause." Further, the Admiral of the Fleet says that our petty officers and seamen of that reserve, "though good individually, are destitute of organization."

¹ Speech at Liverpool, "Times," 13th January.

² "Times," December 31, 1891.

³ The Admiral does not include the stokers.

I have quoted Sir Geoffrey at some length, as his opinions naturally carry great weight; his proposal for a reserve is "to train young men in large numbers, so that when thoroughly disciplined they may overflow into the mercantile service as reserve men, bound for a certain period."

The consideration of his proposals will follow more naturally later, but it is clear that in his view the present system fails to give us the numbers we require, and that he is dissatisfied with both the quantity and quality of our reserves. That this opinion is shared by the Admiralty to some extent is shown by the Manning Committee recently formed, and by the remarks of Mr. Forwood, previously referred to.

My proposals are as follows:—Seamen boys to be entered as at present, but to serve only for seven years in seagoing ships, from the age of eighteen.

Stoker boys to be entered at the age of seventeen at the barracks, for one year's training in gunnery drills, gymnastics, boat sailing, pulling, and a preliminary course of stoking. To serve for seven years, from the age of eighteen, similarly to the seamen boys.

Both classes to have the option as far as possible of joining either—

(a.) Coastguard and Harbour Defence Force.

(b.) The Royal Naval Reserve.

My idea would be to develop a harbour defence force to man harbour defence vessels, gunboats, and torpedo-boats, some of which should be stationed at various ports round the coast, as the French are doing. As the Admiralty have decided that the defence of the naval arsenals is to be entirely in military hands, the harbour defence force for Portsmouth, Plymouth, &c., would be under the orders of the General, though its discipline would of course be under the Admiralty. I confess that from this point of view especially it appears to me that it would be of advantage if the garrisons of the seaport towns were mainly naval, and under the naval Commander-in-Chief.

I have stated that I should like to give the men their choice of the Coastguard and Harbour Defence Force, or the Royal Naval Reserve, but it would probably be advisable to limit the former to 10,000, and if there were too many volunteers, the Admiralty would of course select the best men. Men choosing the Coastguard and Harbour Defence Force to serve for a further period of seven years, at the expiration of which time either to stay in the Coastguard or in the Reserve for eight years, or to be discharged.¹ Men choosing the Reserve to serve for a minimum of five years, with the option of continuing in the Reserve until the age of forty.

¹ From the remarks of several of the speakers in the subsequent debate, it appears that my meaning was not clearly expressed. I intended that each boy on joining should serve for a minimum of twelve years, from the age of eighteen, as at present, seven under the pennant and five in the Reserve, but, if after the seven years at sea he elected to join the Coastguard and Harbour Defence Force, he was to re-engage for seven years, or a total of fourteen years from the age of eighteen.
—E. R. F.

Scale of pay, drills, &c., for the new Reserve to be assimilated to that of present Royal Naval Reserve, which I should propose to call the Royal Naval Mercantile Reserve.

Pension to be much as at present to those completing time in Coastguard, and graduated for those completing all their time, either partially in the Coastguard and partially in the Reserve, or wholly in the latter.

A selected number of young men, not exceeding 10 per cent., promising to make good petty officers, gunnery instructors, or warrant officers, to be allowed to volunteer for a second seven years in the Fleet, and to complete time for pension if of good character, or to be allowed to join the Reserve to complete their time; if doing the latter, pension to be equivalent to those completing time after the first seven years in the Coastguard.

The Marines to remain at about their present strength, 14,000.

In order to carry out this system, it would probably be necessary to increase materially the entry of boys, and to raise the number from 7,000 to 10,000 under training. I have no data on which to calculate the number of boys which would require to be entered to be trained as stokers. On the one hand, we have at present a very few stokers in the Coastguard, and practically none in the present Royal Naval Reserve. On the other hand, with the system of boy entry I propose, and even with the entry and training in gunnery as now carried out, the waste will become less, whilst in the industrial employments of the country stokers are plentiful, and a stoker requires a less period of training than a seaman. I should say, therefore, that to increase the number of boys entered for stokers by one half more than the present entries would be sufficient to supply the waste, and allow of a certain number overflowing into the Coastguard or the Reserve.

It is evident that if these proposals were adopted we should have too many seamen and stokers in the barracks, and it is essential that our seamen—and as I now call them I refer to the whole number so called in the Estimates, which includes stokers—should have as much experience at sea as possible. How is this to be done? My suggestion would be to withdraw the Marines from seagoing ships, and, if necessary, from the First Reserve (Coastguard) ships, filling their places with seamen, boys, and stokers; the latter would form a fourth watch, as suggested by Mr. Harry Williams, Chief Inspector of Machinery, thus allowing each watch of stokers to work on deck alternately.

As there are over 4,000 marines now in seagoing ships, and 2,500 more afloat, we should thus have a fair margin, enabling us to give our seamen and stokers as much sea experience as at present. The Marines would still assist to man the purely harbour defence vessels and the mobilized ships, the Admiralty regulating from time to time the number, if any, to be employed in the Coastguard ships. It might be advisable to leave a small detachment in each ship for marine servants and special sentries.

These proposals are of course open to objection. I shall be told

that I am withdrawing the Marines from the sea, and generally substituting younger and less perfectly trained ships' companies than we have at present, but I would answer that if we are to have a reserve some sacrifices are necessary, that our crews will even then be composed of more experienced men than those of the French, German, Italian, Russian, or, I believe, any foreign Navy, while it is evident that service afloat is more necessary for the seaman and stoker than for the marine. I would also point out to any of my sailor critics who are so strongly in favour of masts and sails as necessary to ensure smartness that, if more training and drills are required for our younger crews, it will serve to keep up their interest in their work, and to smarten them up generally.

I have not attempted to estimate the expense of these changes. There would doubtless be some considerable increase in the expense of the training service, and larger reserves must cost more money, but, if efficiency is the result, this is practically of no consequence. My contention is that we urgently require a reserve, and, if so, we must pay for it. I would point out, however, that our present system practically gives us no reserve, while at the same time the pension list for seamen and Marines has been increasing of late years at the rate of 12,000*l.* to 15,000*l.* yearly. The pension list would of course decrease in future years, should my suggestions be adopted.

My principal aim and object has been to form a reliable Naval Reserve; it is true that, though a commencement would be made at once by allowing men of more than seven years' service to go into the Reserve, little effect would be produced for some years, but even ten years hence the Reserves would probably amount to 5,000 or 6,000; and I should hope that in fifteen to twenty years the Coastguard and Harbour Defence Force would number 10,000 instead of the 4,000 present Coastguard, while the new Royal Naval Reserve should be double that number. This Reserve would, of course, be in addition to the Mercantile Royal Naval Reserve, with which I do not propose to interfere, and with a Reserve force of 30,000 men-of-war's men and a total naval strength of personnel of more than 120,000 men we should, I consider, be amply provided with men at the outbreak of war.

It may be asked, "Why is it necessary that we should make such changes and sacrifices now, we have done well enough without them hitherto?" My reply is, "Look around you. We have seen of recent years entire nations in arms, till Europe has been turned into an armed camp. While this feverish activity was confined to armies, we could afford to look on complacently, and, fortunately for us, sailors cannot be so easily improvised or trained, whilst, however numerous the 'inscripts' or naval conscripts of foreign Powers, they were of little use without sea experience and vessels to fight in."

The latter cost money, limiting directly the naval ambitions of our possible enemies, but it is evident that, now that the principal European Powers have reorganized their armies, they are turning their attention to their navies, so that even since our Naval Defence Act was passed, and perhaps partially as a reply to it, France, Italy,

Russia, and Germany have been spending large sums in increasing their naval force, and already it is clear that we must reconsider our naval programme in order to preserve the proud position necessary for us of mistress of the seas.

This, however, is not my theme, but it is evident that our position when the Naval Defence Act was passed is not that of to-day, and that we can no longer rely on a small number of men forming a standing navy with a very limited reserve. Even a war with France alone would strain our present resources, and we have the authority of the First Lord of the Admiralty for the statement that we should aim at nothing less than having a naval force equal to that of any two Powers, say France and Russia.

The above outline of what I should propose for our personnel is, I am conscious, very incomplete, but I am satisfied that it fairly represents the direction in which we must move, and though my subject is the training of our seamen, this must depend in great part on the system of entry and the time spent under the pennant.

Turning, then, to the training of our seamen, the system which I advocate is one which is suitable to boys who will only spend seven years man's time in the Navy as part of the seagoing force, except in the case of specially selected men; but, before going into details on this subject, I propose to deal shortly with the question of organization, which depends closely on our system of entry, and is also intimately connected with early training. Organization, it is evident, must be affected by the time to be served under the pennant, and though this should more logically follow than precede early training, as the latter is the most important point and my immediate subject, I prefer dealing with organization first.

In the article by Sir Geoffrey Hornby,¹ from which I have already quoted, the Admiral of the Fleet advocates a plan for naval regiments or permanent crews, which he believes would be of advantage in making more close and permanent the connection between Officers and men and increasing efficiency through the confidence engendered by long association. It is a fascinating idea, but it would undoubtedly be difficult to carry out, and while it would have some advantages, as the Admiral himself sees, it would be likely to lead to specially favoured regiments.

There are also general objections to the regimental system as regards promotions, which have been a great difficulty in the Army, and there are, it seems to me, other and simpler ways of improving our organization. The Marines, for instance, are an example of *esprit de corps* acting without this stimulus, of which we have all seen examples when detachments from different ships are brigaded together ashore. The Admiral advocates the regimental system so as to obviate the strangeness of Officers and men to each other and to the ship when newly commissioned. This, however, is now being met to some extent by the system of skeleton crews in ships forming the Fleet Reserve, and I should be glad to see this principle carried further by every ship ready for commission having her Captain nominated to her as is

¹ "United Service Magazine," September, 1890.

done in the German Navy, who should be on full pay without command money.

My further suggestions on this point would be that the seamen's barracks should be made as home-like as possible, in this respect following the example of the Marines. I would also reduce all terms of service abroad to two years, as is done by the French and Germans. To attain to some continuity of system and to obviate the great waste of time and efficiency while a new ship's company were hulked abroad at Malta or elsewhere on recommissioning, I should like to avoid recommissioning abroad altogether, but, so long as a ship is fit to continue in commission without a thorough overhaul, I would change Officers and men as their time expires, and keep the ship in commission "as a going concern," to borrow the language of the business world. This is the system at present adopted with the Channel Fleet, and I fail to see why it should not be applicable to all stations. It would necessitate, no doubt, constant drafts going to and from their stations, but this is the case now, and a ship recommissioning abroad usually leaves one-third of her crew on the station as being less than eighteen months from England. I would also advocate the ships being changed from one station to another frequently, as there is no doubt that ships long stationed in unhealthy climates frequently become infected.

It seems to me that the above proposals would have the following advantages :—

- (a.) It would retain ships abroad which are in good condition, thus avoiding the expense of sending them home, or having everything pulled to pieces to satisfy new Officers.
- (b.) We should escape the loss of efficiency when all Officers and men are alike new to their ship.
- (c.) The danger to discipline now incurred while a new ship's company are hulked for months and the ship is having a thorough overhaul would be obviated.
- (d.) Officers and men would be more contented, as the period of service abroad would be shorter, and they would feel secure of not being kept away from England on an unhealthy station for more than $2\frac{1}{2}$ years at most, instead of any time between 3 and $4\frac{1}{2}$ years as at present.

In other respects than those I have referred to, our organization appears to me to be satisfactory, and this is, I presume, the view of most naval Officers, as, except Sir Geoffrey Hornby, no change is proposed by those who have written on the subject of the training of our seamen.

I now come to my third head and subject proper, which involves the important point as to the system on which our boys and young seamen should be trained. Is our present plan of boys' training ships, with brigs attached, satisfactory, or in what way should it be modified? Is training in masted ships advisable or necessary in the present state of the Navy? Is a training squadron of masted ships performing evolutions under sail a necessity, should it be increased so as to train more men in old-fashioned seamanship, or, on the other

hand, should it be abolished as an anachronism unsuitable to the requirements of the present day? These are points which have been warmly debated in this theatre, and in the pages of the "United Service Magazine." Sir Geoffrey Hornby¹ has given his high authority in favour of training in sailing ships; while Captains Noel² and C. Johnstone³ have followed suit in urging strenuously the necessity for the retention of masts and sails as a means of training.

Here, then, we have a most experienced Officer of high rank, backed by two talented Captains on the active list, pressing for more old-fashioned seamanship training—and their views must be treated with respect. On the other hand, we have Chief Inspector of Machinery Mr. Harry Williams⁴ and Captain FitzGerald⁵ apparently (for the latter, as usual with him, writes in a humorously extravagant vein) arguing that seamen and stokers should be interchangeable, and that the stoker-gunner or gunner-stoker is the man of the future.

Now, I wish to approach this subject without prejudice, and, as I began my lecture by saying, I am not aware of having any fad or hobby of my own on the subject, but I claim to look facts clearly in the face, and I decline to be led away by false sentiment to make a move in the wrong direction.

The old question, so often raised and so differently answered, is What is seamanship, and who are seamen? The simple answer should be, in my opinion, that a seaman is a man inured to the sea. It follows as a corollary that he must be an adept at the handicraft necessary to enable him to live on the water. He must accordingly be able to manage his ship or boat or the machine in which he floats.

But ships and boats have varied, and will continue to do so, though, according to the mast-and-sail advocates, it would almost seem as if nothing was a ship which had not masts, and was not propelled by the wind, and no one was a sailor who had not served in such a ship. According to this view, it would mean that sailors have only existed in the last five centuries, and that they are about to perish out of the land. The narrowness of this definition needs only to be stated to be appreciated. In my estimation, those who managed the triremes, and knew how to propel them by oars at the rate of 8 or 9 knots,⁶ were sailors of their day, and their glory has departed. Captain Mahan⁷ tells us how much discussion there was as to the tactics and management of fire ships in the days when Rupert and Monk fought their bloody actions with De Ruyter and Van Tromp; yet this skill, too, is a lost art. Later, again, there was a time when,⁸ "through

¹ "United Service Magazine," August and September, 1890.

² "R.U.S.I. Journal," 1889, No. 149.

³ "R.U.S.I. Journal," July, 1891, No. 161.

⁴ "United Service Magazine," June, 1891.

⁵ "United Service Magazine," April, 1891.

⁶ Dr. Warre's Lecture, "R.U.S.I. Journal," 1876, vol. xx.

⁷ "Influence of Sea Power upon History."

⁸ Mr. Walter's account of Anson's voyage, when speaking of the accident to the Spanish flagship off the Horn.

the negligence of an Officer of the watch," it was not considered extraordinary that a ship's masts should be rolled over the side; yet Officers of the watch in sailing ships of our days have known no such responsibilities.

Captain Noel,¹ in defining seamanship, says, truly, "It is the science in which our sea fishermen excel, and which makes them the independent and hardy race whom none can fail to admire" . . . "it must be instilled into us in our youth, and can only be instilled by constant sea work—constant battling with the elements;" and then, leaving this firm ground, he goes on to quote Sir Geoffrey Hornby as affirming that this seamanship, which in the premiss has nothing to do with sails, can be learnt "only with the help of the teaching power of sails."

With this view I entirely disagree. Sails are, or rather were, an essential part of seamanship; but seamanship no more depends upon sails and sail power than upon a knowledge of machinery in a steamer. Sails were, in fact, only the machinery of a certain age. The best sailors were always the men of most general knowledge and adaptability, while the inferior men were content to be able to work the systems with which they were familiar.

A short yarn will best illustrate my meaning. Some fifteen years ago, when I commanded a Coastguard ironclad, a chief officer who was in charge on the forecastle, though full of zeal, was unaccountably slack in carrying out orders, and I sent for him, after some difficulty in getting the preventer main-brace manned. His answer to me: "Beg pardon, Sir, but I am not accustomed to these here square riggers," explained the matter. He had served all his time at sea in Coastguard cutters, and was, probably, as good a seaman as we had in the ship.

The subject is an interesting one, and I feel inclined to dwell on it; but I will only state my opinion, that seamanship may and will exist entirely without regard to sails, of which I give the following illustrations:—

It was seamanship which enabled the late Sir William Hall (Nemesis Hall) to bring his frail craft safely to China by "undergirding the ship" in the first China war.

It was seamanship which Captain Kane displayed when he took the "Calliope" safely to sea, in the face of the hurricane at Samoa, which we all remember.

Seamanship was shown in putting together and fitting out the sternwheel gunboats "Herald" and "Mosquito" in the Zambesi by Officers and men of the East Indian squadron in 1890; and Lieutenant Keane (now, I am glad to say, promoted to Commander) has shown the possession of seamanlike qualities in navigating his command safely in the shallow waters of that river, and in keeping his ship in good condition, and his men in fair health, notwithstanding many difficulties about the supply of naval stores and provisions.

This is true, the advocates of sails may say, and fairly satisfactory as regards Officers who, after all, learnt their seamanship in

¹ "The War Training of the Navy," July, 1891, "United Service Magazine."

masted ships; but for the men we want gymnastic exercises aloft to give them self-reliance, activity, nerve, courage. There is something in this argument, but both the Captains to whom I have referred agree that sham drills are of little use, and that there must be real sailing and dependence on sails.

That this is possible now in the Service they cannot show. Captain Noel gravely assures us that the training squadron in which he served had covered a distance of 55,432 miles,¹ of which 32,210 miles, but little more than half, were under sail! He proposes a new training squadron of faster steamers in which the sail power must perforce be a farce.

Captain Johnstone² argued in this Institution last year in favour of masted ships on foreign stations, as "in certain cases the peace occupations of the Navy can be performed as well under sail as under steam." This was certainly not my experience in the East Indies, and if it means anything it entails the substitution of slow steamers with good sail power for efficient modern cruisers, a policy which was attempted fifteen years ago, and which has been wisely abandoned by the Admiralty as being discreditable to the naval power of the country, and a source of danger in case of war.

It would almost seem as if these Officers had entered the Service fifty years ago, had then closed their eyes, and like "*l'homme à l'oreille cassée*" of Edmond About had woke up with horror to find sails discredited, when the fact is they have themselves taken no small part in the gradual change that has taken place. Their arguments would, in my opinion, have been much more apposite had they been given to the naval world fifty years since, when the change was being initiated, than at the present day, when it is nearly completed. The shifts that they are put to, to which I have above referred, shows the weakness of their case; but I should like to speak with more respect of the strong advocacy for the old seamanlike training by Sir Geoffrey Hornby. This is not only on account of his rank and reputation, but because he logically accepts the fact that the old training of a sailor, if it is to be a reality, must be carried out in sailing ships. His proposal is³ that the Admiralty should build or acquire "small clipper ships of 800 to 1,000 tons," to sail to Australia, refit, and come home again, the crews to consist of 250 to 300 men, 50 of which to be Officers and instructors. "24 of these clipper ships would train 4,400 young seamen" yearly, he tells us. Now this is thorough, and if the old seamanship is to be galvanized into life again, this is the way to do it. But any one can see the objection to such a course: there is the expense, the taking away of 6,000 seamen from the active Fleet and placing them in non-fighting ships, where they would be in danger of being taken prisoners in case of war; but, besides these obvious objections, whilst they were learning their seamanship, there could be little man-of-war routine, and no gunnery or torpedo instruction, so that I think the gallant

¹ Captain Noel, "R.U.S.I. Journal," 1889, No. 149.

² "R.U.S.I. Journal," July, 1891, No. 161.

³ "United Service Magazine," September, 1890.

proposer must himself see that his suggestion has no chance of being adopted.

To me it appears that such a scheme, even if it cost nothing, would do more harm than good, while from its lack of real preparation for a modern man-of-war's man's duties it would be most unpopular. I wish to speak with all respect of the plan, as something similar occurred to me some years ago, though further consideration has convinced me of its impracticability, but if so we must resign ourselves to gradually giving up the old seamanship, as it has in fact given us up. This brings me to the masted training squadron. In my view, a cruising squadron is distinctly a good thing, both from a naval and a political point of view, and so long as we have suitable masted ships, I see no harm in its being retained as at present. At the same time, if I have gathered aright the opinion of naval Officers, both those of high rank and junior Officers, as it is worked at present, everything, gunnery, discipline, cleanliness, being sacrificed to sail drill, I consider it a mistake, and I doubt whether we should not do better by following the Germans in forming our training squadron of mastless vessels. I am in no hurry to make such a change—it will come soon enough, and the transition should be as gradual as possible; but I deprecate any attempt to put back the hands of the clock, and I would rather step forward to meet the change which, however unpalatable, is inevitable.

Our Cassandras will reply that, if this is so, our seamen in the future will be very inferior to those of past days. I confess that I fail to see this, and I have some reason for the faith that is in me. The first ship that I went to sea in, in 1849, was the "Queen," a first-rate, Sir W. Parker's flagship in the Mediterranean, a sailing ship, of course, and she had a smart ship's company. Now I picture to myself fifty of the best seamen in the "Queen" as I remember them falling in on the quarter deck, and on the other side fifty of our best men in the "Boadicea," my late flagship in the East Indies, and I try to compare them. First let us look at them as sailors, as Sir G. Hornby, Captains Noel and Johnstone understand the term, and I have little hesitation in saying that the worst of the fifty "Queen's" would probably be a better sailor than the best of the "Boadicea's;" but let us look at them as men-of-war's men, and I have no doubt as to the "Boadicea's" being the best; they would be better trained and disciplined, know their work better, be infinitely superior in intelligence, cleanliness, and discipline, and even in physique.

I do not think that I make any mistake here, and to what is this due? My reply is: to better training, more system, more attention to food and comforts, more education. Can we not, to use Sir Geoffrey Hornby's words, "continue to shape in the same factory where we have approved the manufacture,"¹ and thus arrest the decadence prognosticated?

But while I refuse to take a step backward, there is no reason or

¹ "United Service Magazine," September, 1890. Sir Geoffrey says "first" factory; I have altered the word to "same," as with the context my meaning might not be intelligible.

common sense in making sudden changes as proposed by Mr. Harry Williams and Captain FitzGerald, who may be reminded that there are still sailing ships being built, and that the art of management of vessels and boats under sail is still necessary to any one calling himself a sailor; so that I can scarcely take their proposals seriously that early education should be precisely the same for seamen and stokers. It may be that in time this might be advisable, and we might begin by training boys to be “all-round men” as they propose, but even so it would probably be advantageous to differentiate them into seamen and stokers as soon as they went afloat.

This brings me to the question as to whether stokers should be combatants, and I think that, bearing in mind that the following are the proportions of seamen and marines to stokers in our mastless ships, they certainly should all be drilled in gunnery, and all stokers 1st class should be T.M.; they would then, of course, be classed as combatants. It is not necessary here to allude to the question of the Officers.

Name of ship and class.	Exclusive of Officers.				Percent- age of of non- combat- ants to combat- ants. ³	Total comple- ment.
	Seamen.	Marines.	Total combat- ants.	Stokers, non-com- batants. ¹		
“Admiral” class.						
“Howe”.....	227	65	292	126	30	525
Belted cruiser.						
“Immortalité”.....	226	72	298	114	27·7	499
“M” class.						
“Medusa”.....	75	21	96	87	47·5	219

Having examined various theories, I propose now to sum up our requirements for a modern man-of-war’s man. These I should put much as follows :—

- (1.) Habit of a sea life, sea legs, sea stomach, &c.
- (2.) Physique, activity, hardness, power to stand considerable changes of climate and of enduring prolonged spells of exceptionally hard work.
- (3.) Efficiency in boat work, anchor work, and general seamanlike knowledge of the day.

¹ As my original percentages appear to have been misunderstood, I have now given the percentage of stokers (who are now non-combatants, but who might be made combatants) to the whole fighting force—seamen, marines, and stokers—who might take part in an action, say as a landing party, exclusive of Officers. There are, of course, necessarily many more non-combatants, and the table does not profess to give the proportion of non-combatants to combatants generally. The whole complement is given for reference.—E. R. F.

- (4.) Efficiency in gunnery and torpedo work of all descriptions.
- (5.) Education, intelligence, trustworthiness.
- (6.) Alertness, readiness of resource, quickness of decision, in fact, the many qualities which are included in the expressive word "smartness."
- (7.) Knowledge of stoking and work in the engine-room.

Let us now examine our present training system for boys, and see how far it meets these requirements. This is generally acknowledged to be admirable, the present regulations having been drawn up by experienced Officers, and issued by the Admiralty as late as January in last year. They may accordingly be considered quite up to date, and, though very elaborate, are very practical.

I do not propose any material change in the system of training in the training ships except in two particulars, to which I will refer presently; but in view of the number of boys under training, which I propose to increase from 7,000 to 10,000, at least four more training ships are required in addition to the "Caledonia," recently established at Queensferry. They might be placed as follows:—one at Liverpool, one in the Tyne or Humber, one at Greenock, and one in Ireland, either at Belfast or Kingstown. This is absolutely necessary, as our present training ships are already overcrowded. The entry regulations and standards appear satisfactory, and they must depend to some extent on supply and demand; the only suggestion which I should make would be that, if possible, the educational standard should be raised from Standard II to Standard IV.

I have no remarks to make as regards school and gunnery except that, as gymnastics form a preliminary to the gunnery courses and that I attach special importance to the gymnastic exercises, if necessary, the time for their being more fully carried out might be taken from the gunnery.

Let us now look at the seamanship instruction of the boys 2nd Class and 1st Class, of which I give the following condensed summary of the Regulations:—

Seamanship Instruction for 2nd Class Boys.

First Instruction	(1.) Bag and hammock.
	(2.) Parts of the ship.
	(3.) Ships' fittings.
Second Instruction	(1.) Boat pulling.
	(2.) Parts and fittings of a boat.
Third Instruction	(1.) Bends and hitches.
Fourth Instruction	(1.) Monkey topsail.
	(2.) Masts and yards.
	(3.) Standing rigging.
	(4.) Sails.
Fifth Instruction	Semaphore, flags, and pennants.
Sixth Instruction	(1.) Lead and line.
	(2.) Compass to some extent. Sailing cutter instruction.

Seventh Instruction.....	(1.) Knotting and splicing. (2.) Blocks. (3.) Rope.
Eighth Instruction.....	Compass and helm.
<i>Ninth Instruction.....</i>	<i>Brig model, running rigging, &c.</i>
Tenth Instruction.....	Mat and sennit.
Eleventh Instruction....	Anchor model.
Twelfth Instruction.....	General <i>résumé</i> .

Seamanship Instruction for 1st Class Boys.

- (1.) Tailoring, signalling, sailmaking, *seamanship*.
- (2.) Boat pulling.
- (3.) Boat sailing instruction.
- (4.) *Exercise aloft*.
- (5.) Swimming.
- (6.) Signals for signal boys.
- (7.) Instruction for call boys.

I would remark here that for the 2nd Class boys only two out of twelve instructions, which I have marked in italics, entail going aloft or knowledge of masted ships, and of the seven heads (or five if we omit specialities) into which the instructions of the 1st Class boys are divided, only one entirely and one partially have reference to masts and sails. Even then, if these instructions were omitted altogether, I do not think we need fear that either the instructor or the boys would find their occupation gone.

Sail drill, I may remark, is only carried out during seven months of the year, April to October included, and I doubt whether even this amount will be found advisable at a northern station like Queensferry or Greenock. The principal suggestions which I should make in regard to the above instructions are (1) that preliminary instruction in stoking with pebbles should be substituted for exercise aloft, say every third day, or when the weather was not suitable for work aloft; and (2) that more attention would be paid to gymnastics. The latter is most important, and I am convinced that the greatest advantage to the physique of our boys would be gained by the course being more thorough than it now is. If necessary, I would even give up gunnery to gymnastics, for the time when a youth will receive most benefit from the course is during his boy's training, when he is well fed and has regular hours. I am, I believe, right in saying that, at present, only one gymnastic instructor is allowed to each training ship, and that he is not always very efficient; there should be at least four. A commencement in this direction was made by the Admiralty in 1888, and Lieutenant-Colonel Fox, the Military Inspector of Gymnasia, informs me that he has trained seventy-four men as instructors for the Navy altogether. This is obviously insufficient, as every large mastless ship should have at least two. Lieutenant-Colonel Fox's lecture at Aldershot in December last is well worth reading, and I extract the following from the report in the "Broad

Arrow" of December 19th: "Some of our sports, said the Colonel, have a tendency to develop only one side of the body; in gymnastics they sought to improve both concurrently, to sharpen the soldier, to teach him how to hold and use his weapons, to walk, run, jump, and climb, and keep him up to the mark without growing stale. . . . It would, he believed, develop self-reliance, determination, and courage in the presence of danger, stimulate the spirit of dash and combativeness, and ensure precision in action."

Of the good effect on the physique of the men, Lieutenant-Colonel Fox gave proof in a squad of the 1st Northamptonshire Regiment, "who had been attending the gymnasium forty actual working days. Their average age was 19 years 2 months; average height 5 feet $5\frac{1}{2}$ inches. On commencing the course the average measurements of the men were:—Chest, $32\frac{1}{2}$ inches; forearm, $9\frac{1}{8}$ inches; upper arm, $10\frac{5}{8}$ inches; weight, 8 stone 13 lbs. They had shown, up to the present time, an average increase of $2\frac{1}{8}$ inches round the chest, $\frac{3}{4}$ inch in the forearm, $\frac{7}{8}$ inch in the upper arm, and 5 lbs. in weight." With such facts before us, following on systematic gymnastic instruction, I venture to think that we have more than an equal substitute for sail drill and work aloft, physically at any rate, and I should be glad to see the Admiralty direct the regular practice of gymnastics, not only to a much fuller extent in the training ships but also in the Fleet. The fact is, that the value of work aloft has been much exaggerated; there is not much "useful work," in a mechanical sense, done in pulling at a rope on deck, and it is well known that the smart upper yard men were often kept there too long, not unfrequently for an entire commission, by Commanding Officers who were naturally loth to relieve them by others less active and well trained. I know in the "Agincourt," where we were constantly changing men, that I found, on inspection, upper yard men who had held that exalted position, as I must admit with much credit to themselves and to the ship, for four years! But when this was the state of the case it is evident that the beneficial effects of upper yard work aloft must have been confined to a few, and that the many got on as well as they could without it.

Before leaving this question of training ships, it has been pointed out to me that the seamanship taught is of too old-fashioned a nature, and I would suggest its being modernized to suit our present requirements, rigging being simplified and splicing wire rope being taught, for instance.

A question intimately connected with training is that of the training brigs, and one is reluctant to touch that palladium of old-world seamanship, for they make such a pretty feature on a bright summer's day as they go in and out of Plymouth Sound "in flashing bravery," their white sails contrasting with the deep green of Mount Edgcumbe. But alas! the poetry of the Navy has departed, and, from a sober, common sense point of view, I feel bound to condemn the training brigs. If our object is to make old-fashioned sailors there is nothing to find fault with in the present arrangements; the sailor must be taught to depend on his sails, and there is no more to

be said; but this teaching is unnecessary now, and it must be remembered that the boys seldom spend more than six weeks at most in the brigs, on which the instructions remark, "that merely working the brig, though excellent practice for the Officers and necessary for the safety of the vessel, is of little use by way of instruction."

The use of the brigs is to accustom boys to the sea, to give them sea legs and sea stomachs, and some idea of life in a man-of-war. It is of little use from a purely seamanship point of view we have just seen, and the brigs are certainly primarily intended to teach the boys, and not the Officers who may happen to be serving in them. My contention is that the old-fashioned seamanship which is learnt in the brigs is of little value; they are very cramped, so that few boys can be embarked at a time, and frequently bad weather forces them to take shelter if at sea, or to remain in port if in harbour. At Queensferry, for instance, I think difficulty will often be found in entering or leaving the firth, so that cruising in a sailing brig connected with the "Caledonia" will be unsatisfactory.

In my view as much sea work as possible is essential, but that there are many objections to a sailing vessel, to which I have alluded. I suggest, therefore, that the present sailing brigs should be replaced by small-powered steamers, with plenty of sail power and good accommodation, such as the "Penguin" class. These vessels could accommodate more boys, could go out and keep the sea more regularly than the brigs, and be more efficient generally. I would have only three or four in the engine-room complement, as the boys should be taught to work the engines and learn stoking, thus following the training now instructed to be carried out by the junior executive Officers. From this point of view, I should myself prefer the "Kingfisher," which is now being sent to the Mediterranean to relieve the "Cruizer," having her engines left in her, and to be worked similarly.

I have now finished with the boys, but we must follow them somewhat into sea-going ships before I close my lecture. In the first part, under the heading of Organization, I advocated shorter commissions as tending to greater comfort and efficiency. Routines are a large subject on which I can only touch lightly, but I think some improvements could be made on the present meal hours if the dietary were also amended to allow of a good evening meal. On board mastless ships, of which our modern Navy now generally consists, it is most important that anything and everything which tends to keep our men cheery and lively should be encouraged. Gunnery, torpedo, and other drills should of course be made as smart as possible, boat sailing, boat racing, rifle shooting should all be looked upon favourably by Commanding Officers. Our men should retain their sailor-like smartness under the new conditions. Whether it is hands or watch fall in, the sea-boat's crew, manning a boat in harbour, water-tight doors, or anchor work, if the work is smartly done, generally against time, as Admiral Colomb remarked, the best part of a sailor's education will be maintained, and they will remain as distinct from soldiers as—well, as they are now. I would also advocate generally

more frequent and shorter leaves, while every opportunity should be taken of giving the men recreation ashore, and joining in such games as cricket and football. Even in tropical and unhealthy climates day leave should always be given. Consuls and other officials are too apt to consider our men as untamed animals who are sure to get into trouble, and when there would be no idea in certain ports under the British flag of confining soldiers to barracks, it is a common custom to request that no leave should be given to seamen. This is, I think, unfair to our men, and it has a tendency to make them think that they are expected to be uproarious, and to act accordingly. Another question intimately connected with comfort is that of the canteen. Though very general, at present no place is allotted for it, and, accordingly, whether there is one or not is at the option of the Captain. There should always be a dry canteen, I think, though the Captain should have power to close it temporarily in case of irregularities. The present system of distributing the boys in the men's messes is not a good one, and with the larger number we should have in each ship they ought to be in separate messes, under a good 2nd class petty officer.

I have not hitherto alluded to the ratings of our men, and there might be much to be said on that subject, but I have no space in this lecture to touch on it beyond this, that I have a strong opinion that much that is optional in the matter of gunnery and torpedo is a mistake; every man-of-war's man should *ipso facto* be a seaman gunner, and the A.B. and T.M. should be granted together. From this point of view, I consider that the new arrangements by which every A.B. is sent to a gunnery ship and put through a course of gunnery which lasts a month a distinct advantage, and I am glad to hear that only 10 to 18 per cent. fail to qualify as seamen gunners. It is not popular with the gunnery Lieutenants and instructors, naturally, as they have occasional bad characters to deal with; but it was clearly wrong to allow the gunnery and torpedo-ships to take all the good men and to leave all the worst characters in the receiving ships. Now, however, that we shall have many more seamen gunners, it is evident that some will be rather inferior, and some further differentiation of their qualifications is advisable.

It has been suggested that a rating of captains of the gun 2nd class should be established for this purpose, and these men would be useful to take charge of Q.F. guns, which now form so great and important a part in the armament of our ships.

These are details, but all such details are important.

I have now come to the end, and, if some of my remarks have been somewhat controversial, I claim to have endeavoured to treat this important subject without special bias, and solely with a view to the future efficiency of the Service to which we have the honour to belong, and which is so necessary to England's welfare. In many cases I have borrowed the views of others, for I have been at some pains to get the ideas of other Officers who are interesting themselves in this all-important question, so, while I acknowledge their help, I make little claim to originality. But I claim to have looked at the

subject from a large point of view, having set before me the words of Professor Soley,¹ who has written much on naval subjects, that "the primary object of a navy at all times is to maintain itself in all its branches, matériel, personnel, and organization in the most perfect state that is possible of readiness and efficiency for war."

Before I sit down, I should like to recapitulate the following points on which to elicit discussion and opinion.

- (1.) I consider our present "personnel" to be inadequate, and I propose to establish a Naval Reserve of men-of-war's men by a system of modified short service. Is this necessary or practicable?
- (2.) I object to recommissioning abroad, but I propose commissions abroad to be continuous, as in the Channel Fleet, so long as the ships are in good condition, and that Officers and men should be relieved after two years' service.
- (3.) I propose that boys should go through a short course of stoking in the training ships, and that more attention should be paid to gymnastics.
- (4.) I propose that stoker boys should be entered at seventeen, and trained at the naval barracks for one year, also that all stokers 1st class should be T.M. and combatants.
- (5.) I propose to substitute roomy steamers with good sail power for the present training brigs, all necessary stoking to be done by the seamen boys.

Admiral LONG: The subject, which we are so much indebted to Admiral Fremantle for bringing before us, is, as he says, one of great importance. I need not say anything about the aspect of affairs abroad after what the gallant Admiral has said in his lecture. If we look at home we see the question of the hour is "free education" and "provision for the aged." Now I think that bears on the subject in this way. It shows that our statesmen and our electors are convinced that the sound training of the individual citizen is absolutely necessary to the health of the body politic. There is no exaggeration in saying that the maritime power of England is the right arm of the British Empire. If that power be suffered to decay from any cause whatever, the British Empire, such as we have known it, will cease to exist. If that be agreed upon, I think we must all acknowledge that no more important subject for our statesmen and our sailors could be brought before us. I have endeavoured to get at some facts as to the numbers of our merchant seamen, but, I regret to say, some of the volumes being missing, I have been unable to get a comparative statement of the number of seamen that were in this country available in 1841 and those in 1881; those abroad in foreign-going ships in 1841 were 138,156, the corresponding number in 1881 being 130,587 from the United Kingdom.² The Navigation Laws having been done away with, it is obvious that those who govern the country should see that a proper provision of seamen is maintained. Then we come to the proposal made in this paper for enlarging the Navy. We are told by the First Lord of the Admiralty that our Navy is to be of sufficient strength to enable us to hold our own against two foreign Powers. We can also see by what is published in various directions that the naval war of the future will probably commence very suddenly, and that very severe blows will be

¹ "The Blockade and the Cruisers."

² From Census Papers.

struck almost immediately. Now I think that is a most important point in considering this subject. We have heard about the great expansion of the Fleet of the United States and our own in past times, but we cannot, I am afraid, derive much consolation from that, because at the present day, this country not being an aggressive country, it is exceedingly unlikely that it will strike the first blow. What we have to look to is that some one else will strike a blow at us very hard, and we must be prepared for that. I think, therefore, what the lecturer states here, that we should consider that "our first line should be thoroughly efficient, and that a large and generally inefficient Reserve is neither necessary nor desirable," is a very important statement. Now we come to the proposal for enlarging the Navy. The first point that the lecturer places before us is that he considers our present personnel to be inadequate, and proposes "to establish a Naval Reserve of men-of-war's men by a system of modified short service. Is this necessary or practicable?" I think there is no doubt that an extension of the personnel of the Navy is necessary; that it will be practicable I have no doubt. Our statesmen will see to it. But the principal proposal that is put forward here, if it is meant to apply to the whole Service—I am not quite certain whether it is—is one to which I can hardly give my adhesion, seeing that it would substitute a shorter period of service for that which is already in force.

Admiral FREMANTLE: It is for the whole Service.

Admiral LONG: There is an entirely new force mentioned here, the "Harbour Defence" force. I am not quite aware what it means, but I think, as I cannot agree with shortening the period of service, it behoves me to try and propose an alternative. I think we shall have to face this fact, that we must enlarge the Navy. In this matter there is some solid ground of which we can all be certain, and that has been alluded to by the lecturer very strongly. That solid ground is that people who are to be seamen must have as large experience at sea as possible. That is a most important point. If we are to have a Navy the men must have experience at sea, or they will not be efficient. This proposal involves the withdrawal of a certain number of men, and the substitution for them of the same number of other men. I am afraid we cannot say that we shall be so much the better for that. We should not have any more men at sea, and what we want is more men at sea. It seems to me the whole pension scheme might be very well looked into. We throw away our people prematurely. You tell a man at the age of forty, when he is most highly efficient and one of the best men, perhaps, we have in the country, "Good bye, there is 35% a year for you; we shall only call you out when war breaks out." At the same time we are to pay other people for defending the ports. It seems to me that these men would be the very men you want for defending the ports. I do not know that it will be unpopular with them, but, of course, that is the question.

Admiral LINDESAY BRINE: It was arranged that they should do that when they were pensioned.

Admiral LONG: I am very ignorant on the subject, I confess. Then there is the question of the Royal Naval Reserve. Before I came here, I was looking up a discussion that occurred some sixteen years ago, and there were some very interesting remarks by the late Admiral John Crawford Wilson on that subject. He said that in order to provide an increased force you must enter about one-third the number of boys every year.

Admiral FREMANTLE: One third more?

Admiral LONG: If you wished to enlarge the force by 10,000 men, you would have to enter about 3,000 boys every year to maintain that number. He also said, like Sir Geoffrey Hornby, that, owing to the Navigation Laws being abolished, the merchant service is no longer a training ground for the Navy, but the Navy might advantageously become a training ground for the merchant service. Of course, for anything of that kind to be carried out practically, it will require the consent of the ship-owners. I know nothing about what they would think about it. Admiral Wilson said that he considered one year was as much as it was desirable to train a boy in a training ship. He said we should train about 3,000 boys per annum one year, then turn them into merchantmen, and let them take their chance, and you would then gather out of the merchant service, when you wanted them, such men as were fitted for your purpose. That was his proposal, similar

in principle to Sir Geoffrey Hornby's, hence worthy of careful attention.¹ There is another point. I think the complements of all our ships at the present are cut down to the lowest ebb. All of us who have ever been Executive Officers know that when you have men on your sick list, and there always is a sick list, you have not anybody to fill up the vacancies; you are obliged to make one man do two men's work. I do not see why, in all our ships of sufficient size, we should not enlarge our crews, so as to be able to abstract a portion of them when war broke out. The larger crews you have, the more men you have afloat under discipline, the better, I believe, for the Service. Then, considering the very arduous nature of the naval service, and the great portion of it which has to be passed abroad, it would be very advantageous if it were an understood thing that people would be employed on foreign service for the first part of their time, and for the last part of their time would be employed nearer home. In the first place they would be the better men during the last part of the time, and they would form a strong element to depend upon in the case of war—a most important point. It would also suit the men better, for, after being fourteen years at sea, they might be married, and they would prefer to be in England. I think something might be done in that way, and by the aid of a progressive pay, to make the Service much more popular. I am told a great many men are taking their discharge at the end of ten years. They do not get any pension: they go into civil employment, where the pay is better. There is one thing the gallant Admiral says about shortening the period of foreign service, and I think that is very important. When we consider how important our men are to us, we must remember that keeping men for a long time in very hot tropical climates is undoubtedly a very bad thing. This fact has been recognized on the West Coast of Africa, and I think perhaps it might receive further recognition; for instance, upon the West Coast of Mexico, and such places, if people are kept there for a long time, they are very apt to feel it in after years. It takes it out of them. Then I come to recommissioning abroad. I am not sure, as far as my opinion goes, that I should ever recommission abroad. I think ships are just as available, whether on the passage home or out, and I do not see why the ships should not come home. One of the things I have heard as a reason for not doing that seems an exceedingly weak one. I am told that after the ship comes home they will pull everything out of her, but I do not see why they should be allowed to do that.

Admiral FREMANTLE: I did not propose to recommission abroad. I say never recommission abroad. Keep the ship back.

Admiral LONG: Yes. I understand that Admiral Fremantle then proposes that boys should go through a short course of stoking in the training ships, and that more attention should be paid to gymnastics. In that matter I should go heartily with the lecturer. He then proposes that stoker boys should be entered at seventeen, and trained at the naval barracks for one year; also that all stokers 1st class should be T.M. and combatants. I think that proposal also would carry my entire assent. Last year when I was out with the squadron, I noticed that a great many of the stokers were practically boys, entirely undeveloped, and very inexperienced, and had that squadron, as might happen some day or other, been called out for actual war, those boys would not have had sufficient stamina to stand the work. They could not do it. The work would be very arduous. It behoves us to take care that our stokers are men, at all events, well grown, strong, and capable for their work, and that table certainly shows that they should be combatants. If we look at a ship as she is in action, there are only three things going on on board. First, there are the men who are stoking; secondly, there are the men who are handing up ammunition; and, thirdly, there are those who are firing. Those are the three things we want to pay most attention to. The lecturer then proposes "to substitute roomy steamers with good sailing power for the present training brigs, all necessary stoking to be done by seamen boys." I should agree with that. I think when we look at sailing vessels compared with the fast steamers of the present day, as I have said before here, it appears to me

¹ See lecture by Captain J. C. Wilson, July 2, 1875, and discussion on Lord Brassey's paper of February 18, 1876.

that the motion of a sailing vessel is so different to the motion of a fast steamer that we can hardly say that a man who has been brought up entirely in a training ship would be thoroughly efficient in a steamer. The other day the Comptroller of the Navy went out to Malta, and it was remarked how many of the temporary crew from the "Aurora" were sea sick. I do not wonder at all at that, because I myself, although I have spent a great deal of time at sea, though I have been round the Horn in the roughest weather, still if I got into one of those steamboats that go dashing against a head sea, I cannot say that I, too, should not suffer. I think the main requirement of the Service is that the men should have as much sea experience as possible, that you should keep the men at sea, and have plenty of them, also that service during peace should be regarded as training for war, all men having their turn at each duty.

Admiral BOWDEN-SMITH: It appears to me that the most important part of the interesting paper we have just heard read by Sir Edmund Fremantle is that portion of it which he devotes to the entry and the time served by our men. I understand the reason for wishing to make the proposed changes is to create a greater Reserve; he thinks that by making the changes he proposes we shall get a larger number of men in time of war. Of course it must be obvious to all of us that our Reserve is at present very small. Other nations are increasing their navies, and I noticed in the "Times" of yesterday Vice-Admiral Hollman, of the German Navy, in introducing the Budget, referred to this question, and proposes to increase the personnel. If I do not go quite with Admiral Fremantle in what he proposes, it is probably because I have not given the question so much consideration as he has. I understand his proposal is in future that both the seamen boys and the boys who enter as stokers shall be entered for seven years only, instead of twelve, as at present, and I would like to ask him what the result would be, supposing at the end of seven years those men decided to leave us altogether; we should neither have a Reserve nor the real thing. And, I think, many of those men would leave us: they would be twenty-five years of age, they will probably not be quite settled down to a seaman's life, they will have visited perhaps American and Australian ports, where they will see high wages being earned, and get ideas into their heads that they might do better, and we should lose them altogether.

Admiral FREMANTLE: I do not propose to let anybody leave the Navy; he must go into the Reserve five years after the seven years as a minimum.

Admiral BOWDEN-SMITH: Then I did not quite understand the gallant Admiral aright. I thought the proposal was that we were to engage the boys at the age of eighteen, and they were to serve seven years.

Admiral FREMANTLE: As a minimum the men must serve seven years, and then go into the Reserve for five years.

Admiral BOWDEN-SMITH: I am very glad to hear that is your proposal. That would be twelve years, as at present. With regard to the second part of the proposal as to their volunteering into what is called the home service, I prefer myself to see the men taking their turn in sea-going ships, as at present. With regard to the men who are to enter the Mercantile Marine Reserve for a further period with a minimum of five years, I do not quite see what greater hold you would have over those men than you have over the present Naval Reserve. I presume they can leave at the end of the time, if they wish. I am rather afraid my friend Admiral Fremantle is copying the short-service system of the Army, a system I cannot approve, and, as a citizen and a ratepayer, I would like to say a few words about the soldiers after they have been discharged. I happen to know that in this great city in which we live a large proportion of the unfortunate people who are out of work in our streets are men who have been in the Army, and are now, or have been, Army Reserve men. I do not say this on my own authority only, but on the authority of a committee of experts (voluntary, of course), who state that probably about one-sixth of the able-bodied men who are destitute in London at the present moment are the unfortunate Army Reserve men. I do not wish it to be implied for a moment that I think a man should get anything but good by going into the Army. He ought to be improved by the discipline, and by being subjected to the influence of such Officers and non-commissioned officers as we have in the British Army; but when a man gets out of

regular civil employment in these keen days of competition for seven years, and tries to get back into it, he finds it difficult to get a berth. In the St. James's district, where they estimated that probably one-sixth of the able-bodied destitute men were ex-soldiers, they also remarked that out of the 1,200 people that applied for relief in 1891 there was not one single able-bodied man who had been in the Navy. Our present system is so good, and works so well, and gives such satisfaction, that I should be very sorry to see it interfered with, and we must go in some other direction to establish our Reserve, which doubtless requires to be increased. With regard to the men who leave the Navy before they get their pensions, even those men you see are educated and trained, so that after we have finished with them they remain good and useful citizens, and are able to maintain themselves, and keep off the rates. There are just three other matters the gallant lecturer has mentioned that I should like to refer to, in which I entirely agree with him. The first is the importance of the extension of gymnasiums and gymnastics; secondly, the extension and development of the dry canteen system; and thirdly, the shortening of the period of foreign service. With regard to the gymnasiums, I am quite surprised that more has not been done already. Now that masts and sails are practically abolished, I look upon gymnasiums as quite necessary. They ought to be established at all our naval stations abroad, as well as at home, the Cape, Simon's Bay, Hong Kong, Malta, and such places. The men could use them for recreation when instruction is not going on, and after they are once built they will be little expense to the country; indeed, the only expense would be the gymnasium instructors, and they should be borne on the flag-ship's books, and could, if necessary, take their turn of sea-service. With regard to the dry canteen, I am sorry to gather from the lecturer's remarks that they are not always provided. Accommodation for the canteen is a very great comfort to the men, and I should also like to see all possible games provided for the men when afloat. Anything that makes a man happy or contented on board ship is a good thing. By all means give them plenty of leave. But I think the lecturer will agree with me, that in some places in the East Indies, such as Aden and Trincomalee, for instance, there is hardly anything for the men to do but to go into the liquor shops and drink the vile concoctions specially prepared for their consumption. Then, as to shortening the period of service abroad, I believe that would be a popular and good change. Possibly we could hardly expect the Admiralty to relieve men every two years on such distant stations as China or the Pacific, but three years ought to be the outside, and I think they might even extend the two years system to Flag Officers.

General DUNNE: Admiral Bowden-Smith alluded to my unfortunate Service, with regard to the number of wandering Reservists, and I quite agree in what he said. I often cannot walk from here to my home without meeting three or four old soldiers, but I think Admiral Bowden-Smith is wrong in comparing it with what would be the case if Admiral Fremantle's Reserve was established for the Navy. There are some men who enter the Army without any other means of earning a livelihood, and whilst they are in the Army the profession of arms teaches them nothing which is serviceable to them as citizens afterwards, except a certain amount of discipline, which, I am afraid, is hardly enough inducement for employment. But surely if Admiral Fremantle's plan is carried out for a large Naval Reserve, those Naval Reservists would be quite a different stamp of men, and they would all get employment during the time they were Reservists; for, being educated seamen, there would be always work for them. I do not, therefore, think it would be the same as Admiral Bowden-Smith alluded to with regard to the Army, and I think you must have a large Reserve for the Navy, as we must have one for the Army. At the present time we have 80,000 Reservists for the Army, and you have very few indeed for the Navy. Therefore I think you can hardly compare them one with the other in their present condition.

Admiral FIELD, M.P.: I rise with great diffidence amongst my brother Officers, but some observations that fell from my friends Admiral Long and Admiral Sir Edmund Fremantle, and also from Admiral Bowden-Smith, seem to call for some notice from myself. Admiral Long seems to intimate that statesmen might do a great deal in dealing with some of these questions that have been brought before us. My humble opinion is exactly in accord with his own as to their

power to do good, but I beg to assure him that they have very little initiative as far as my experience goes, and that it is more important that pressure should be brought to bear upon them by discussions in places like this, than that it should be left to the initiative of statesmen in the House of Commons. The members of the House of Commons are our very best friends, and I am certain that no expense that might be recommended by naval Officers of authority—I mean such as I see around me here—would ever be grudged by that House. I have never known a vote ever questioned where any necessity has been shown for any increase of expenditure in my particular department. I remember very well having a discussion with a prominent Radical—Admiral Commerell knows him quite well—before the Naval Estimates came on, one day. I said, “Now we are going to have a naval hornpipe to-night, and I hope you will not interfere with us.” What was his reply? He said, “My dear Field, I would give you another million, anything you want, for the Navy, though you must take it out of the Army.” I had much sympathy with that feeling, though I said I did not join with him quite in desiring to take anything from the Army, but I did desire a large increase of naval expenditure. I beg to assure Admiral Long that you never would have had a Naval Programme at all if it had not been for the pressure brought to bear by distinguished naval Officers outside the House of Commons, as well as by a few modest naval men who are inside it, and by the assistance of the press and public meetings in the city of London. Therefore, if you want anything out of the Government, they are like a ripe orange—you must squeeze them to get the juice out. Discussions in this theatre are of enormous value, because they tend to shape opinion: they tend to enlighten our leaders, and may possibly bear good fruit in the near future. I only rose because I have thought a good deal upon this question, and I challenged more than once our heads in the House of Commons, because I have said, and said last year, it seems to me the question of managing the Navy, when we have got the Naval Programme carried out in its entirety, has never been properly faced by the responsible Admiralty Officers: and all that they have done, and all that they did last year, when the Naval Estimates came on, was to give us a contemptible increase of about 2,000 men and boys, of which, I believe, about 1,000 might be set down to the training ship in the north of Scotland. I have always felt that much more might be done in the way of making preparation to form a Naval Reserve of a superior class, to prevent our seamen, at expiration of their ten years, going away from us. In that respect I have much sympathy with what has fallen from Admiral Fremantle, but I am utterly opposed to his view, and agree with Admiral Bowden-Smith in his objection to shortening the term from ten to seven years. When you are dealing with boys you can do what you like with them; the State makes a bargain with them, or with their parents rather, on their behalf, and you can very well lay down the principle that they shall serve ten years from the age of eighteen, and at the end of ten years, if they do not re-engage, they shall then enter the 1st Class Naval Reserve for another five years, or for as long as you like—that is a mere detail.

Admiral FREMANTLE: I mean seven years afloat, and afterwards another five years.

Admiral FIELD: I have always held that we ought never to allow these valuable men to go altogether, and I have always felt that the payment of 2*d.* extra to these men when they re-engage was a contemptible increase, when you look at what a magnificent man a seaman is at the end of ten years. But we are not considering that so much as whether these men should be engaged to go into our Naval Reserve or re-engage. If you want to create a Naval Reserve of these men, then to raise the pay might be a mistake; but you can do what you like with them when you engage them as boys. I used to be told that the ten-years men, when they did not re-engage, went into the London Fire Brigade. You want to retain them, and to enter them in your first-class Naval Reserve. I am strongly of opinion that the short-service pension which is now allowed by the Regulations, but which he rarely gets, should be a man's inalienable right to demand, if he does wish to re-engage at the end of ten years from the age of eighteen; I think the short-service pension is little short of a fraud as at present worked: it is never made use of; no man gets it, if he is sound in health and limb. Admiral Long

said he was not aware of the number of *bonâ fide* seamen in the merchant service. I have looked a good deal into this question, and I understand the number is diminishing year by year; that, two or three years ago, there were not more than 40,000 *bonâ fide* seamen coming up to the word "seamen" in the merchant service. That is a terrible falling off. I am one of those who have been doing a little in a humble way to try and arouse the authorities in the House of Commons, who ought to be interested in this question, by last year drawing attention to the great waste that is going on in our reformatory and industrial school ships. I would beg, with all respect, to call the gallant lecturer's attention to that point. If we can by any means in our power find a method by which we can do something to repair the terrible waste in the merchant service by infusing new elements of better trained lads into that service than are now received from the shore, we shall be doing good, because the more we can improve the *moral* of the mercantile marine, the better it is for the Imperial Service, inasmuch as we shall be able to draw from it in time of war. I will ask the gallant lecturer to pay a little attention to this subject of the industrial and reformatory school ships of the nation. They are all managed by voluntary committees; but I have found, on examination and inquiry of the Captains of the ships—for they are commanded by naval Officers, and therefore they are entitled to our sympathy—that these ships practically do not do the work they are intended to carry out. Not more than 40 per cent. of the boys in these ships go to sea at all, and the ships are never full. There are, I think, close upon 3,000 boys in course of training on board these thirteen ships. What I say is this, that no boys ought to be allowed to be committed by law at all to any ship; but the ships ought to be manned from the land industrial and reformatory schools; in other words, the ships and the schools should be affiliated together; the ships training the superior class of boys for the mercantile marine received from the land schools. We all know that there are boys who may be eager to go to sea; but when they come on board an industrial school ship, having been committed by the magistrates, anyone can tell, at a glance of the eye, that they will never make sailors: they are poor, weakly lads, picked up from the gutter, real objects of pity. They are often boys who deserve our sympathy: they have committed no real crime, but they have done what many of us have perhaps done in our youth. I am for improving that system, and, having called for a Parliamentary Return for what the result of five years' work has been in all those ships, I find the waste going on is terrible. We have a right to demand that these boys shall be made some use of for Imperial purposes, seeing that the nation pays the larger part of the expense of their training. The private subscribers are scarcely worth mentioning: large annual sums are paid by the Treasury, and it is by those grants chiefly that these ships are maintained: and if more attention were paid to the boys in them, they would form a valuable body, coming forward year after year, and so impregnating the mercantile marine with better material, which would react beneficially upon the Imperial Navy. I came here as a listener. I am always grateful for any information I can pick up in this room, or by any other method, and I do my best to support the policy which is initiated by my brother Officers, who know so much more about these subjects than I can pretend to do. I am only one member out of five who endeavour to do our duty in the House of Commons, and I beg to assure my brother Officers here if they want any good done for the Naval Service these discussions will greatly contribute to the end they have in view. The Government in my humble judgment will never take the initiative in the House of Commons alone, unless it is backed up and driven forwards by naval opinion.

The CHAIRMAN: I think we are hanging upon one point a little too much; I think Admiral Fremantle wished to dwell more upon the education of the boys as we govern them, and the Army as we govern them, than on the plan of getting them.

Admiral LINDESAY BRINE: One word on the question of Reserves. There is a point, I think, perhaps the lecturer did not sufficiently dwell upon in speaking of his scheme of establishing a good Naval Reserve, which is this, that we have established a good Naval Reserve out of our own pensioners from the men who take their pensions at thirty-nine and forty years of age, between that time and the age of

forty-five ; these 1st Class Pensioner Reserves are a most valuable body of men ; and when a plan was drawn up some years ago, as to the best way of utilizing our Reserves, it was found that between the ages of thirty-nine and forty-five, we had several thousands of first-rate trained men-of-war's men. These men can be either used on board ships, or they can be employed in our ports. I do not think sufficient weight has been given to the importance of seeing that instead of these men being thrown away, as somebody has said, when they get their pension, they really become our most valuable reserves. None of us can quite tell what value to place on our 1st or 2nd Class Mercantile Reserve. They may turn out very good men, but it is possible that in time of war they may in some respects fail. One thing we know, and that is that about 5,000 of our best 1st Class Mercantile Reserve are men many of whom have filled positions as mates of sailing ships, and are always will be ready for service, as they are chiefly employed at our seaports. We are certain of obtaining these men in the event of war, and they are first-rate men. We are also certain of getting about 5,000 good pensioners. Thus it may be expected that we should have 12,000 or 13,000 good seamen immediately available, and we can rely upon them to start with. What will happen after that none of us can say.

The CHAIRMAN : I will just say one word about the question which Admiral Brine has started about the Reserves. The other day we wanted 100 men to take up excessively good positions at Portsmouth in the harbour ships, and out of these 9,000 excellent men between the ages of thirty-eight and forty-five we could not get 100.

Admiral BRINE : They would be obliged to come in case of war. They would not volunteer : they do not want to come, but in case of war they have got to come.

The CHAIRMAN : A volunteer is worth two pressed men.

Admiral COLOMB : Were they to have full pay ?

The CHAIRMAN : We offered to engage them for two years and, if they remained for two years, to pay them for their clothes. The question which Sir Edmund Fremantle has raised is, of course we know, impossible to be argued out in an afternoon, but I must say I think we have got to face a fact—it may be a very unpalatable one to a great many of us ; it is a very unpalatable one to me—and that is, that as masts and sails have passed away, the training of the men in that line who worked them will have to pass away too. We know very well that in former days we always looked amongst the upper yardsmen for our petty officers and best men ; and why was it we looked there ? First of all, we always picked out the youngest, smartest, and most promising men to put there. Having put them there, the necessity of going aloft quickly, and of obeying command immediately, made them smart, well-disciplined men. These men on the upper yards have had to look danger and death in the face pretty often, and that has made them self-reliant. I am very much afraid that what Sir Edmund Fremantle says is perfectly true, that some of your very smart Commanders of line-of-battle ships, when they got good men, did not like to part with them. The Commander of the "Queen" says, "No, I am not going to let my upper yardsmen go, because the 'Caledonian' will beat me next exercise day." There is no doubt that was the case, but at the same time I believe and hope it was not general ; and if you could look back to the services of our old warrant officers at the present day, you would find that those men had been upper yardsmen, they had done their duty as young men in that position, and they had gained discipline and self-reliance, and have done their duty up to the end. There is one other point I wish particularly to dwell upon and in which I agree with Sir Edmund Fremantle only partially, and that is, I do not think it would be a safe thing, looking at what has happened in the Army, to go even to the fringe of short service. It is not generally known what it costs us to bring up and feed our boys ; but, allowing for the waste of those who turn out not worth keeping, and there are a good number of them, it costs over 250*l.* per head. Now, is it wise for us (it is after all a matter of cash) to take and educate a boy to the tune of 250*l.* and then to let him go at the end of seven years ? I think you will find the waste in the future will be very great. I have no doubt in the world the Naval Exhibition may bring us good boys at the one end, but I am

quite certain it will put off a number of good ten years' men at the other, Everybody in London seeing that fine body of men, so well disciplined, so well ordered, such sober, fine-looking men, why they would snap at them, and you would find hardly a man who has been up from either Portsmouth or Plymouth, and has taken part in the Naval Exhibition, who is not already suited, when his ten years are up, to a billet. I am very glad for them, but I am very sorry for the Service, because I think we shall lose more than we can spare. Sir Edmund Fremantle is very much pleased with the education of the boys in the training ships. Now, I think he is a little inconsistent about that, and I will tell you the reason why. Look at that list! He tells us you must do away with masts and yards and topsails, and yet he approves of training a boy upon a monkey topsail. What is the good of half those "bends and hitches"? I went on board the "St. Vincent" once or twice at hours when they did not expect visitors, and I saw the number of useless things that they were teaching these boys. I said, "Halloa, what have you got here?" "Oh! we are just teaching the boys to turn in a dead-eye cutter-stay fashion." The cutter-stay fashion was done away with before I entered the Service, and that is fifty years ago. They complain that the time given to education is not sufficient, and yet they are teaching these boys all these obsolete things. I do not think that education satisfactory, and, though it was revised only two years ago, I say tear it up and start a new one. As far as the brigs are concerned, when I was at Portsmouth, the very first application I had was, "Have you any objection to letting one of the tugs tow the brig out of the harbour on Monday morning and tow her into the harbour on Friday night?" I said, "Most decidedly not. If she gets ashore once, the Lieutenants and boys will take jolly good care they don't get ashore a second time. Getting out of and into the harbour is about the best part of the week's work," and I am convinced you will all think that. I will say no more. We have heard a most excellent paper, and if you do not wish to continue the discussion, I am sure we shall be very glad to hear what Sir Edmund has to say in reply.

SIR EDMUND FREMANTLE: Before I answer the various speakers who have taken part in the discussion, I should like to make one or two corrections. I thought perhaps somebody might challenge my statement about the Officer of the watch being afraid of rolling the ship's mast over the side. It sounds rather strange. The fact was I was quoting from memory of a very old account of Anson's voyage, by a Mr. Walter, written in 1748; his actual words are, speaking of the Spanish Admiral Pizarro's flag-ship going round the Horn, "being off Cape Horn and going before the wind in very moderate weather, with a swelling sea, by some misconduct of the Officer of the watch, the ship rolled away her mast, and for the second time he was obliged to put back to the River Plate." I also made a mistake as to the percentages. Admiral Brinc was sharp enough to see that; the percentages are liable to be misunderstood, and I propose to alter them.

ADMIRAL COLOMB: It depends on whether you take the percentage of the whole.

ADMIRAL FREMANTLE: Eighty-seven is about 45 per cent. of the whole amount; it is 90 per cent. as compared with the sailors and marines, that is, the percentage of non-combatants to combatants is right, but the percentage of non-combatants to the whole amount is not correct. Admiral Long made some remarks about the difficulty of getting statistics as to the merchant seamen. That is true enough. It is extremely difficult to get any statistics, and when you ask the question you are told that the fact is that many Norwegians, Danes, Germans, and other good people enter themselves as if they were English, although you can see clearly enough by their manner that they are not. There is no machinery, I believe, by which the Board of Trade can tell us what number of English seamen we have. Mr. Forwood talked of increasing the number by 10,000 in the Naval Reserve, but we heard from Admiral Field that he did not think there were more than 40,000 British seamen altogether in the merchant service, and my own impression is that that is pretty correct. Admiral Long criticized somewhat my proposal about enlarging the Navy. He agrees that it should be enlarged, but he does not give us any account as to how exactly it should be done, except, as far as I can make out, that we should have more ships, and spend more money. I think we

want a very largely increased Reserve, and if that is the case, we must have something a little different from what we have had hitherto. That has been the only idea, more ships and more money. What we really want is an expansive Navy, and not so much an expensive one; that is my idea. There has been a misunderstanding by several speakers, including Admiral Long, as to recommissioning abroad. I distinctly said I do not approve of recommissioning abroad. Therefore I do not think there will be more recommissioning abroad, but on the other hand decidedly less. Technically, there will be very much less; Captains will be relieved every two years, and other Officers every two years. [A Member.—How about the Admirals?] It might be a good thing also to relieve Admirals in two years. As far as discipline is concerned, it will be a very good thing. As far as political requirements are concerned, it would be a bad thing. As far as discipline is concerned, as in the Channel Fleet, it is an extremely good thing to relieve the Admiral every two years, and it would be a great mistake to have him there for three years; but you must recollect that, whether in the Mediterranean or on other foreign stations, there is a great deal of political work which is done by the Admiral, and, from a political point of view, the Commander-in-Chief is better for being kept there longer; but in all other respects I should say distinctly that two years is long enough for fish, flesh, or fowl, which includes the Admirals, of course. I do think it would be a very good thing to constantly keep ships going as a going concern. People's ideas are such that, when a new Captain and a new crew come to a ship, he always wants to pull everything to pieces. I have myself experienced that when a man is leaving he considers that his ship is in a very good state; all is going on first rate, in fact. I might mention the "Boadicea" as an instance; she steamed 12 knots all the way from Colombo to Aden; she did more than 12 knots up the Red Sea, and therefore could not be in a bad state. When, however, she arrived at Malta to recommission, everything had to be pulled to pieces to satisfy the new people, and we have heard since by the papers that she was in a very bad state. I do not deny that it is satisfactory with regard to the machinery to have it taken out and examined from time to time to see what state it is in, but this is frequently done on change of Officers when it is unnecessary; and if the instructions said it was not necessary, and that you were not allowed to do it in the middle of the commission, the responsibility is not yours. The ship has been running very well, we will suppose, and pulling her to pieces is unnecessary and expensive, and does not tend to efficiency in any way. I should like to avoid that. Admiral Bowden-Smith appears to have particularly misunderstood me as to the question of men leaving after seven years. If anybody will read my lecture carefully, he will see that a man is bound to serve twelve years from the age of eighteen as a minimum; he has seven years under the pennant as a minimum, and then he must go for five years into the Reserve, after which he is free. I propose to offer him a somewhat easier service for the next seven years if he chooses to re-enter for that time at the expiration of his first seven years. Therefore I take every man for a minimum of twelve years. I also want to get some men for fourteen years, and I hope to get some for twenty-two years, and my idea was that 10 per cent. were to enter with a view of going on and becoming petty officers, or continuing their service to complete for pensions under the pennant. I do not advocate short service as it is generally understood. It is very natural after what has taken place in the Army, where a great deal has been sacrificed to short service, to say do not let us have the same in the Navy. Admiral Bowden-Smith himself says that none of our ten years' men, who, if you please, do not get any pension at all, or any reserve pay, or anything else, do not come on the rates. Why not? Because they have a profession. But I am proposing to put people in the Reserve who will get a month's training, which the Army do not. I propose to pay them a retaining fee, and they have their trade after that, and the fact remains that the ten years' men do not come on the rates. It is no use talking about copying the Army: I would copy anything that is good. It is a very common thing if anybody has any objection to anything to set up a prejudice by saying, "Oh, the Germans have got it, or the French have it: we do not copy the Germans or the French." The fact is, there is nothing original under the sun,

and every idea that I have in my head, and I believe most of the ideas in most people's heads, have come out of somebody else's heads. The two years system I believe to be perfectly practicable abroad; at all events, I can never see why the Germans can change their men, why the Frenchmen in Madagasear can change their men, and say exactly to a month or two when the exchange will come, and yet we cannot do the same. Three years is supposed to be the time, but it very often gets very near to four years. I fail to see why we cannot relieve people every two years. It would be a good thing for the health of the men. Some of the Captains on the East Indies station whom I see present here will corroborate what I say, viz., that in the third year of commission in a tropical climate the men break down very much, and that many a good man might have been saved to the Service, and to himself and his wife and family, if the ships had been sent home in two years instead of three. Admiral Field also misunderstood, to some extent, the time of service, and spoke a great deal about industrial school ships and reformatories. There is no difficulty at this time in getting boys, and therefore I do not think that question arises. Admiral Lindesay Brine said if we wanted a Naval Reserve, we could get it from the pensioners of the Navy, that is, from men after they have reached forty years of age. He said he would get several thousands; afterwards he said 5,000.

Admiral LINDESAY BRINE: I thought so.

Sir EDMUND FREMANTLE: It may be so, but we heard from Sir Edmund Commerell that when he wanted them in peace-time, and offered a very fair inducement, he could not get them.

Admiral LINDESAY BRINE: That is only as volunteers, but these men are obliged to come. Their addresses are known; they are paid by Paymasters, and they can all be got in case of war.

Sir EDMUND FREMANTLE: But I maintain they won't be of much use. As a rule, sailors, on board ship, after the age of forty, are generally looked upon as very old fellows. We think everybody is young who is about fifteen years younger than ourselves, but I think if you were to poll the ships' companies in Her Majesty's Navy, and ask them about people over forty, they will tell you they were rather old for the trade. That is entirely corroborated by Sir Edward Commerell. If you take 90 per cent. of the men over forty, you will find, on their part, a great reluctance to go into sea-going ships, and if they were forced to go, I doubt whether you would find them as efficient as you would like. I prefer younger men myself; if it is a good thing to have these men at the age of forty, it must be a very much better thing to have some Reserve men at the age of thirty. I should like to have them if I can. Sir E. Commerell addressed himself to the "fringe of short service"—a very good expression! I admit it is a "fringe," and many people do reasonably object to the "fringe of short service," and to that I plead guilty; but I think they are a little frightened by the name, and that some modified form of short service, if people would only think it over, will be a very great improvement on our present system, which is really, although thoroughly efficient for a moderate Navy, not thoroughly efficient for a very large Navy, and we must have now, as I have endeavoured to show, a very large Navy. There was a letter in the "Times," written not very long ago, by "Au Courant," and he actually argued that, as we have very few seamen, we must have small ships; that we cannot afford to man big ships. I think that is really putting the cart before the horse, and if that is to be the result of our having a sort of standing Navy of this kind, it will be dangerous for the best interests of the country. Before I sit down I should like to refer to a point which, to my astonishment, has been very little referred to. I rather challenged criticism as to the training of our men. I did not say that I would keep on the "monkey top-sails" or "bends and hitches." I proposed to modify that. I think it is a matter of detail, but I pointed out that even according to the present view of the training Officers of the Admiralty, that if you take away those two subjects which I have italicized, there will still be a good deal of seamanship left. I should like to see the list modified considerably in certain details. I did expect to be directly challenged as to what our sailors were to be in the future. Two lectures have been given in this Institution recently, and received with great approval by many distinguished Officers, in which it was

said that everything was going to the bad rather faster than usual, that everything would have gone to the bad absolutely when masts and sails were finally abolished.

Admiral BOWDEN-SMITH: When that question was brought before the Institution the majority of opinion was decidedly against masts and sails.

Admiral FREMANTLE: The snake may be scotched, but it is not killed. I received a letter this morning from a distinguished Officer whose opinion I value very much. I will not mention his name, but he said he would go so far as to paraphrase the expression of a French philosopher, and say that, if masts and sails did not exist it would be necessary to invent them, to ensure the efficiency of navies. He does not tell us how he is going to invent them. Therefore, I maintain that those people who wish to retain masts and sails, and make that entirely the foundation of our training in future, are bound to say into what ships they will put them, and where they will put them. I do not know if there are any Home Rulers here, but it is rather like the Irish Home Rule Bill. Before the Bill comes out they say, "Oh, we are going to make a Bill so that it shall be all right, and the supremacy of the British Parliament will be maintained." So it is as to the sails. Everything is all right. "We are going to keep masts and sails, we are going to have the maritime supremacy of this country maintained," but they cannot tell you how it is to be done. Directly they bring their little Bill on the table they find a great difficulty. I am very much obliged for the kind way in which very many of you have spoken of my lecture. I did not expect it to be received with general approval, but I do wish people would look into the question of short service, upon which I think we have dwelt a little too much, while, on the other hand, we have dwelt too little on the question of training. My proposal is made after great consideration, and I have overcome some prejudices in making it. I have stated that the first line of defence was the most important thing in my opinion—that is, to have our ships well manned, well armed, well disciplined, well officered—rather than to have a large and inefficient Reserve. At the same time, on looking into the matter, I was very much impressed with the fact that we have not got enough people, and I do differ certainly from Admiral Long and others, who seem to put on one side that question, to throw overboard the short service, and say, We won't have anything to do with short service. In that case you will want simply a larger and more expensive peace Navy, and I am sure you are asking for a thing which is not exactly reasonable, and which you are not likely to get. Therefore, I ask people to look with a little less prejudice upon a proposal for creating a Navy which shall give us a more reliable reserve in case of war. It appears to me, as regards the short service, that the Army, the very people who ought not to have adopted it, did adopt it, and that the Navy, who really ought to have adopted it, as the men have a profession to fall back upon, have not tried it.

The CHAIRMAN: I am sure you will empower me, in your name, to return our hearty thanks to Admiral Fremantle for his most excellent lecture.

FOREIGN SECTION.

THIS portion of the Number, hitherto the Occasional Notes, has now become the Foreign Section, and is reserved for articles, either original or compiled, on professional subjects connected with Foreign Naval and Military matters; also for notices of Professional Books, either Foreign or English.

The Council of the Institution wish that this section shall be developed still further, and I have undertaken to continue my Editorship during the current year, with a view of aiding them in carrying out this work. It seems to me possible to make this section, and consequently the Journal, the means of keeping our Members acquainted with all naval and military progress abroad *pari passu* with that progress; and I shall be glad to receive from members of both Services, including in the latter those of the Auxiliary Forces, suggestions, information, or offers of assistance.

It is desirable, further, that I should state that, as regards editing the Naval matter in the Section, I shall have the aid of Naval Officers, thoroughly competent to give good advice and to pronounce sound opinions.

It must, however, be borne in mind that, as the change from a quarterly to a monthly issue has been made in order to ensure the more prompt publication of the Lectures after their delivery than has hitherto been the case, the Foreign Section will, as a rule, be restricted in extent during the Lecture season in the first half of the year, and will be prominent in the second half.

It is requested that communications and books for review (the latter under cover to the Librarian) may be addressed to me at the Royal United Service Institution, Whitehall Yard, London, S.W.

LONSDALE HALE,

Colonel R.E. ret.

THE RUSSIAN NAVAL MANŒUVRES OF 1891.

Translated by permission from the "Marine-Rundschau" by
Commander H. GARBETT.

I. *The Idea of the Manœuvres, the Vessels engaged, and the Manœuvre Regulations.*

FOR the purpose of this year's manœuvres of the Russian Fleet, the ships composing the Baltic Squadron were divided into two squadrons, intended to operate the one against the other. The attacking squadron was placed under the command of Vice-Admiral Kasnakow, who had Rear-Admiral Lazarew as his second in command, and consisted of the following ships and vessels:—

	Displacement.	Speed.
The ironclad "Emperor Nicolas I"	8,840 tons ..	15
„ "Emperor Alexander II" ..	8,840 „ ..	15
„ "Duke of Edinburgh"	4,600 „ ..	14
„ "Admiral Greig"	3,593 „ ..	10
The corvette "Rynda"	2,950 „ ..	15
The clipper "Najesdnik"	1,334 „ ..	13·5
„ "Wjästnik"	1,256 „ ..	13·5
The torpedo-cruiser "Lieutenant Iljin" ..	595 „ ..	18
The torpedo-boat, 1st class, "Reval"	100 „ ..	—
„ „ „ "Lachta" ..	74 „ ..	—
„ „ „ "Narwa" ..	74 „ ..	—
„ „ „ "Ekenäs"	81 „ ..	—
The transport "Artelschtschik"	577 „ ..	—
„ "Samojed"	771 „ ..	—

Vice-Admiral Kasnakow had his flag hoisted on board the "Duke of Edinburgh," and Rear-Admiral Lazarew his on board the "Emperor Alexander II."

The defending squadron was under the command of Rear-Admiral Gerken, with Rear-Admiral Walizki as his second in command, and was made up as follows:—

	Displacement.	Speed.
The ironclad "Admiral Spiridow"	3,740 tons ..	10·5
The armoured gunboat "Tscharodeika" ..	2,020 „ ..	8·5
„ „ "Grosjaschtschi" ..	1,490 „ ..	15
The corvette "Skobelew"	2,400 „ ..	12
The clipper "Strelok"	1,340 „ ..	11·5
„ "Plastun"	1,250 „ ..	12
The gunboat "Snjeg"	400 „ ..	9
„ "Grosa"	400 „ ..	9

A horizontal number line with tick marks at -5, 0, 10, 20, 30, 40, and 5. A bracket is drawn above the line, starting at 2 and ending at 4, representing the interval $2 \leq x \leq 4$.



(G. Neher)



	Displacement.	Speed.
The gunboat "Jersch".....	360 tons ..	9
„ "Wichr".....	394 „ ..	9.5
„ "Burun".....	413 „ ..	9
Torpedo-boat, 1st class, "Abo"	76 „ ..	—
„ "Borgo"	81 „ ..	—
„ "Kotlin"	67 „ ..	—
„ "Luga".....	74 „ ..	—
„ "Sveaborg".....	100 „ ..	—
The schooner "Slawjanka".....	162 „ ..	—
And eight 2nd class torpedo-boats.		

The relative strength of the two squadrons was almost identical with that of the preceding year, the attacking squadron being the same numerically, viz., 4 ironclads, 1 corvette, 2 clippers, a torpedo-cruiser, and 4 1st class torpedo-boats, while the defending squadron this year was stronger by a corvette and a 1st class torpedo-boat. The real fighting strength of the attacking squadron this year was, however, greater than that of last year, as two of the ironclads were the new seagoing battle-ships "Emperor Nicolas I" and the "Emperor Alexander II."

The general idea of the operations was almost identical with last year's, and was as follows:—

A hostile squadron commanded the Baltic and Gulf of Riga, and had established itself in the Moon Sound. The sound was used as a base of operations in order to blockade the Gulf of Finland, to destroy the seaborne trade, and to damage as much as possible the trading ports between Sveaborg and Bjorkö. The defending force lay partly in Sveaborg and partly in the Finnish fiords and inner waters protected by the shoals along the coast. The enemy's aim was to keep the ships in Sveaborg shut up there, and to prevent a junction of his opponent's forces, while he at the same time attacked the vessels distributed among the fiords and inner channels. The defending Commander, whose duty it was to defend the principal Finnish seaports, utilizes the separation of the enemy's forces to attack his single ships: he also endeavours to break through the blockade established by the enemy from the Finnish fiords and the roadstead of Helsingfors, and, concentrating off the Moon Sound, cut off his opponent's communications with his base. His principal object is to collect his force in Sveaborg, and then threaten the enemy in rear. The general outline of the manœuvres was, therefore, the same as last year. No hard and fast instructions which would interfere with the free hand of the two Commanders were given, but the following regulations were laid down:—

1st. The whole attacking squadron was to assemble in the Moon Sound on the 15th August. The defending squadron was to be distributed at the same time in Sveaborg and the fiords and channels lying to the east of that port.

2nd. The entrances from the sea to the different fiords and the channel up to Sveaborg were considered as barred by mine-fields, in

addition to which the mine-field at Rotschensalm, in the channel leading to the Little Pellinge and the Trangsund, was supposed to be defended by light artillery. The Commander of the defending squadron was to draw out plans for the mine defences, and communicate them to the Umpire-in-Chief.

3rd. Reval, Porkala-Udd, and Hangö-Udd were also considered as fortified and protected by mines, so that these roadsteads could not be used or captured by the enemy.

4th. It was further understood that a portion of the hostile fleet should be stationed off the Tolbuchin Lightship and blockade Cronstadt, so that the route to the fortress behind the Meridian of Werkömatala was barred to the defending squadron.

5th. The enemy was forbidden to obtain or transmit news by telegraphic despatches, and was ordered to trust entirely to the scouting of his own ships for news of the movements of the defenders.

6th. The defending force could avail themselves of the land telegraphs and signal stations erected on the coast for learning and transmitting all the movements of the enemy.

7th. The supplying of the ships of the attacking force with coals and provisions was to be carried out from the Moon Sound, and for this purpose the transport "Artelschtschik" and the schooner "Samojed" were detailed.

8th. From 4 A.M. of the 16th August all merchant ships which were met by the ships and torpedo-boats of the defenders in their sorties from the different fiords, and whose names were ascertained and entered in the log-book, were to be considered as ships of the enemy captured while conveying stores, &c., for the fleet of the latter. It was a condition, however, that the capturing vessels should not themselves be destroyed or taken by the enemy, as in that case the prizes were also lost.

9th. If mines were laid down anywhere by the enemy in order to prevent the breaking out of the defending ships, the vessels engaged in laying the mines were to remain on the spot out of range, unobserved sufficiently long to lay the necessary number of mines to form a barrier, and were not to be driven off; and in laying down the mines only that number could be counted which were actually on board the ships of the squadrons.

10th. In order not to interfere with the movements of merchant ships, no buoys or other marks were to be laid out as a sign of a mine-barrier.

11th. The attacking squadron must use avisos for discovering the positions of the defender's forces.

12th. The Commandants of the manœuvring squadrons were to have charts made out twice a day, showing the position of the enemy's ships according to the latest news received. The ships were to be designated not by their names, but by their description.

The following Officers were named as Umpires:—Vice-Admiral Stezenkow, Umpire-in-Chief; Rear-Admiral Makarow and Captain of the First Grade Wulf as Umpires; two Staff or subordinate

Officers were attached to each Umpire. The Chiefs of the manœuvring squadrons were to communicate their plans to the Umpire-in-Chief.

In addition to the foregoing manœuvre regulations, certain other rules were laid down, which were to form the basis for deciding on the operations of the squadrons or single ships. These were as follows:—An action could only be successful if the opposing ships were under 12 cable lengths (2,200 metres) apart. If the number of guns of similar calibre of one ship was double that of her opponent, the latter would be considered out of action after an hour's fight, and, upon signal from the Umpire, was to leave the field of battle, unless the stronger ship had neutralized his superiority by bad handling. An action an hour in length was, however, to be accepted as normal, according to which the victory would be decided. Each ship received a co-efficient of strength, according to which—

6-inch (15 cm.) gun.....	= 1
8- and 9-inch (20 and 23 cm.) guns ..	= 2
11- and 12-inch (27·5 and 30 cm.) guns	= 3
9-pr. (6·3 cm.) gun	= $0\frac{1}{2}$
47-mm. gun	= $0\frac{1}{4}$

The co-efficient of strength of a ship followed, then, from the sum of the number of her corresponding guns; according to which, for example, the co-efficients of the following ships were—

The "Emperor Nicolas I" and "Emperor Alexander II"	= 26·5
„ "Rynda"	= 13·5
„ "Grosjaschtschi"	= 3·0
„ "Lieutenant Iljin"	= 1·25
„ Clippers	= 5·5
„ "Admiral Greig"	= 10·75
„ "Admiral Spiridow"	= 8·25
„ "Tscharodeika"	= 8·0

In the event of a ship approaching within 4 sea miles of a fortress and remaining exposed to its fire for fifteen minutes, she was to be considered out of action, so also was a 1st or 2nd class torpedo-boat which approached within a mile and remained under fire. If a ship lying at anchor was approached within three cable lengths (550 m.) by one of the enemy's with the obvious intention of ramming, she was to be put out of action. All ships which had been put out of action by the Umpires were to leave the scene of action, and take no further part in the manœuvres for twelve hours. If an armourclad met an unarmoured ship, the probability of victory for the first was three to one, in the case of an armoured ship against a half-armoured one, or the latter against an unarmoured one, the chances were to be considered two to one. Fire was only to be opened against the enemy after careful aim and judging of his distance, and only from those guns which could actually be brought to bear against him. If a

torpedo-boat approached a ship within two cable lengths (365 m.) without being fired at, the ship was put out of action; the same thing occurred to a ship which had her torpedo-nets out, if two torpedo-boats were allowed to approach within two cable lengths. If, on the other hand, a torpedo-boat at a distance of less than seven cable lengths (1,280 m.) was exposed for three minutes to the fire of a quick-firing gun, or for two minutes to the fire of two or three quick-firing guns, or one minute exposed to the fire of four or more, she was to be considered as destroyed. Should several boats attack a ship simultaneously, the time in which they might remain under fire without being destroyed was prolonged by a minute. Torpedo-boats which had discharged the torpedoes in their tubes were to retreat out of range of the ships while they reloaded, in the event of their having spare torpedoes on board. For the reloading, at least half an hour was to be counted. A torpedo-boat was to be considered out of action, 1st, if she singly met two hostile boats. 2nd, if, when lying at anchor, she was attacked by another boat. With regard to the mine-barriers, the following regulations were laid down:—

Should a ship pass over a hostile mine-field which was known to the Umpire, without having searched for mines, she was to be considered as destroyed. Should several ships in line ahead pass over a mine-field, without first removing the mines, the foremost ship in narrow channels was to be considered as destroyed, and in large channels the two foremost ships. A mine-field was only to be considered effective if three rows of mines with not more than 100 feet (30·5 m.) interval between the mines were laid down. Two boats which could be sent in advance to remove the mines were to take at least ten minutes for each mine and must work on the exact spot where the mine-field had been considered as laid. Whether the work was successfully performed or not would be communicated by the Umpire by signal.

The using of hired boats and vessels which carried a foreign flag and the wearing of plain clothes by Officers and men were forbidden.

In addition to the general strategic and tactical duties of the squadron experiments were to be made as to the best form of signals for distinguishing friends from enemies, and the effective zone in which 1st and 2nd class torpedo-boats can act independently was to be carefully ascertained.

II. *The Operations during the Manœuvres.*

After the two squadrons had taken up their respective stations, the manœuvres immediately commenced, and lasted from the 16th to the 20th of August. The reports about the course of the operations and the performances of individual ships are not sufficiently in detail to allow us to trace out a perfect picture of all that took place, but they suffice for a general review. On the morning of the 16th, the attacking Commander found himself with his whole force in the western portion of the Gulf of Finland. Of the ships told off for the squadron, the "Nicolas I" appears to have been withdrawn, as she is never mentioned. The Commander-in-Chief divided his ships into three

squadrons; the first consisted of the armourclad "Duke of Edinburgh," the corvette "Rynda," and the torpedo-boats "Narwa" and "Lachta"; the second of the armourclad "Alexander II," the clipper "Wjästnik," and the torpedo-boats "Ekenäs" and "Reval," and the third of the armourclad "Admiral Greig," the torpedo dispatch-boat "Lieutenant Iljin," and the clipper "Najesdnik." The second division received orders to reconnoitre the fiords from Helsingfors to Aspö, and to ascertain the strength of the enemy in that part. While they steamed to perform this duty, the two other divisions proceeded eastward, keeping as far to the southward as possible. The "Lieutenant Iljin" was dispatched to thoroughly reconnoitre the fiords between Aspö and Bjorkö; the squadron, after passing Hogland Island, kept to the eastward of the island during the night, and remained there till morning with their lights masked. Early in the morning of the 17th, the transport "Artelschtschik" joined the squadron, and with its help, a landing brigade was conveyed to the northern point of the Hogland Island, and occupied the village there without meeting any resistance. Soon afterwards, the second division rejoined the flag, reporting that the fiords from Aspö to Helsingfors were apparently not occupied, while the enemy, as far as could be seen, had collected his force in the latter port. The Commander of the squadron, Admiral Lazarew, therefore received orders to blockade Helsingfors with his force, and above all things prevent the defenders from breaking out to sea. After the second division had again parted, the "Lieutenant Iljin" returned from reconnoitring, and reported that she had searched the Bjorkö Sound and the Great Roads of Trangsund without seeing anything of the enemy, she, therefore, considered it certain a division of the defending squadron was concentrated at Aspö. In order to ascertain this for certain, the Admiral dispatched the "Rynda," accompanied by the torpedo-boat "Narwa," with orders to go to Aspö.

During these events, the defending Commander also took his measures to carry out the duties assigned to him. He divided his force into several unequal divisions, and dispatched them presumably within the fiords to those channels which lead to the more important coast towns. In Helsingfors there remained the armourclad "Admiral Spiridow," the armoured gunboat "Grosjaschtschi," the corvette "Skobelew," the gunboats "Grosa" and "Burun," as well as the torpedo-boats 1st class "Abo," "Kotlin," and "Sweaborg," and some 2nd class boats; the armoured gunboat "Tscharodeika," the clippers "Strelok" and "Plastun," the gunboats "Jersch" and "Wichr," the schooner "Slawjanka," the 1st class torpedo-boats "Borgo" and "Luga," as well as four 2nd class boats, were sent to Aspö, while the gunboat "Snjeg" and a 2nd class torpedo-boat went to Trangsund. When the last-named vessels arrived at their post is not given, but they probably arrived almost immediately after the "Lieutenant Iljin," having made her reconnaissance, had again left.

On the 17th, at 8 p.m., the torpedo-boat "Narwa" returned from Aspö, and reported that five of the enemy's ships were off the roadstead, and that they had discovered the presence of the "Strelok,"

"Plastun," "Borgo," and "Luga." The "Rynda" had been surprised and attacked by the two torpedo-boats, but the attack had failed, as the high sea running made it impossible for them to approach the corvette within range; she, on the other hand, had fired at the boats with her quick-firing guns, and having kept them under fire the allotted time both boats were put out of action. At the conclusion of the action the "Rynda" left for Bjorkö Sound. After she had searched for mines, but finding no enemies, she proceeded to the Great Roads of Trangsund. Here the gunboat "Injeg" and a 2nd class torpedo-boat were lying, and after a short action they were forced to succumb to the superior force of the "Rynda."

While the attacking force had thus scored some successes, the defenders did not remain inactive, but were bestirring themselves to damage the enemy. A particularly smart blow was dealt the enemy by the gunboat "Grosjaschtschi." She succeeded, on the evening of the 17th, in breaking through the blockade maintained by the "Alexander II," the "Wjästnik," and two torpedo-boats, and escaped to sea. She must have slipped away quite unseen, else it is difficult to explain why she was not pursued. The "Grosjaschtschi" next captured, in accordance with No. 8 of the Manœuvre Regulations, a number of transports belonging to the enemy, and then went on to the Moon Sound. Here she destroyed all the coal and provision depôts, laid out a number of mines, and returned, unattacked, to Helsingfors. By this operation the attacking fleet was robbed of its base, and was compelled to establish a new one.

In the night of the 17th—18th, followed, on the side of the defenders, an attack by torpedo-boats on the enemy's squadron, which was lying at anchor off the northern point of Hogland Island; although they had guard-boats on the look-out, their torpedo-nets were, apparently, not out. When Rear-Admiral Walizki, who was lying at Aspö with a division of the defending squadron, learnt the position of the enemy, he dispatched the three torpedo-boats "Borgo," "Luga," and "Kotlin" to the attack. About 9 p.m. the boats left the roadstead. The hitherto strong south-westerly wind had subsided somewhat, but the sea was still high. The torpedo-boats had to steam against wind and sea, so the "Borgo," which was the fastest, drew ahead of the others; when she arrived off the northern point of Hogland she kept close under the land and proceeded along shore. About 10.50 p.m. she discovered the masts of the enemy's ships, which showed out against a tolerably clear horizon, and the boat, which had now approached towards the centre of the squadron, shaped its course for the most seaward of the ships, and steamed full speed towards her. After she had turned, she steamed alongside and gave some short whistles as a signal of the complete success of her attack; steering again to Hogland, she now received the first shot from the blown-up ship, which was the "Admiral Greig," and immediately the whole squadron opened fire. The confusion was utilized by the "Luga," which had now come up, to steer through the unilluminated part of the sea until she was close

under the stern of the "Duke of Edinburgh" and to discharge her torpedo at close quarters. Both torpedo-boats escaped after having made a most successful attack.

In view of the reconnaissance which had been made off Aspö, the attacking Admiral determined to proceed there at full speed against the reported weak force of his opponents, and to cut them off from the squadron in Helsingfors. For this purpose, at daybreak on the 18th August the frigate "Duke of Edinburgh" (although by the regulations she was out of action until midday), the cruiser "Iljin," and torpedo-boats "Lachta" and "Narva" proceeded to Aspö, to prevent the defenders' ships from breaking out. After the mine-field had been cleared away at the entrance and the squadron was approaching the Luppi Beacon, the Admiral observed that the three ships of the enemy, the gunboat "Tscharodeika," the clippers "Strelok" and "Plastun" were steaming full speed through the fiords to the west, apparently in order to join the main body of their fleet. In order to prevent this, Admiral Kasnakow signalled to the ironclad "Admiral Greig," the clipper "Najesdnik" and the torpedo-boats "Reval" and "Ekenäs" to close, and as soon as they had joined him, he steamed with his whole force in column in line ahead on a course parallel with the ships of the defenders. As the latter were inferior in speed and force to the attackers, Admiral Kasnakow pursued them for only as long as was necessary to put them out of action. However, it is not quite certain whether he succeeded in this, and it is not quite easy to make out what exactly did take place. During the artillery duel the "Iljin" and four 1st class torpedo-boats undertook an attack upon the enemy's ships; the torpedo-boats, however, failed in their part, and only the "Iljin" was in a position to discharge two torpedoes at the "Tscharodeika," but with what result is not known. When the action was ended, Admiral Kasnakow turned back and looked for the other portion of the defending force. At two different stations within the fiords were discovered the gunboat "Wichr" with two 1st class torpedo-boats, and further under the land the gunboat "Jersch," schooner "Slawjanka," and two 2nd class torpedo-boats, which had all come out from Rotschensalm in order to rejoin the other ships of the detached squadron, under the orders of Admiral Walizki. Admiral Kasnakow directed the "Iljin" to attack the "Slawjanka," while the clipper "Najesdnik" and the torpedo-boats "Lachta" and "Narwa" dealt with the "Wichr."

Both attacks failed, as the "Slawjanka" managed to escape through the inner channels, while the "Wichr" was fortunate enough to take up so favourable a position in the narrow channel Kitelsund, by the island of Sur-Musta, that she could not be reached. The "Lachta" and "Narwa," in their attempts to take the gunboat in rear, were suddenly attacked by two 2nd class torpedo-boats, which had been lying completely concealed behind the nearest islands, and according to the rules they were put out of action, as they were at the same time subject to the fire from the quick-firing guns of the "Wichr." The "Lachta" also, in manœuvring in the narrow channels, took the

ground, but without sustaining any damage. The "Wichr," however, took advantage of the unfortunate position of the two attacking gunboats, and steaming out of the narrows with the two 2nd class boats she attacked the "Najesdnik" and forced her to withdraw.

After the failure of the enemy's squadron in their attempts against the fiord-flotilla, the Admiral re-anchored in the roadstead off Fort Slawa, and sent the torpedo-boats "Ekenäs" and "Reval" to join the division blockading Sveaborg. The night of the 18th—19th August passed quietly, and the next morning the squadron weighed, and returned to its old anchorage off Hogland Island. Here also returned, in the course of the morning, the "Ekenäs" and "Reval," which, having been repulsed in an attack upon the ironclad "Spiridow" and the corvette "Skobelew," were placed out of action.

In this attack, which probably took place off Helsingfors, the torpedo-boats, however, succeeded in destroying the gunboat "Grosa," which, believing them to be friends, allowed them to approach without opening fire upon them.

During the 19th of August the attacking squadron remained at its anchorage and completed with coal from the "Samojed" and transport "Artelschtschik."

At 6 P.M. the ships weighed, and taking the channel south of Hogland, steamed in two columns to the westward. The defending squadron was so weakened by having to detach vessels to Aspö and Trang sund, that it was not in a position, without recalling these ships, to undertake the duty of threatening the enemy in rear. As the Commander did not succeed in reuniting his ships at the proper time, nothing finally remained for him to do, except to give battle off the roadstead. When, therefore, at daybreak on the 20th August, the attacking squadron hove in sight of the Grahara Lighthouse, the ships of the defenders were observed to have left the roadstead of Helsingfors and to be standing to the eastward. A dense fog which set in prevented any operations during the forenoon, and concealed the movements of the opponents; when it again cleared, it was evident the defending Commander wished to fight a decisive battle. After the armourclad "Alexander II" and the clipper "Wjästnik" had rejoined the attacking force, the squadron formed line-of-battle in columns of divisions in line ahead, and advanced to the attack.

At a distance of about 3 sea miles from the enemy, Admiral Kasnakow re-formed single column in line ahead, and opened fire at about 4,000 yards (4,000 m.) upon the enemy, who had adopted a similar formation. After both squadrons had maintained for an hour an ineffective cannonade, and were off the Sztina Shoal, the Commander of the attacking squadron, about 5 P.M., ceased the action, and the manœuvres came to an end.

III. *Critical Discussion of the Manœuvres.*

In the Russian manœuvres, perhaps, in consequence of the very meagre reports which have been made public, were only a few

occurrences which have a further interest in their bearing on the solving of tactical and strategical questions.

The forces were insufficient for carrying out the duties assigned to them, and the time allowed too short. Nevertheless, certain actions were fought, which deserve attention, as they throw a light upon the influence of local surroundings outside the general maxims for carrying on of war, and also upon the value of certain rules and the correctness of old lessons. The general idea was the same as last year, the seat of operations was the same as it would be in war if Russia should be attacked by a superior naval force. In consequence of the great extent of coast which had to be taken into consideration, and the proportionately small forces which took part in the manœuvres, a number of assumptions were necessary, which gave operations a fixed direction, which would not have been the case had the attacker had freedom of movement and action, and not been restricted to time. Thus, the principal seaports of the south coast of Finland were closed to him, and there were everywhere mine-barriers, partly protected by artillery, where the channels through the shoals lead to the small ports between Sveaborg and Bjorkö. In addition, the entrances to Hangö and westward from Helsingfors-Sveaborg, were considered as fortified and impregnable. The other assumptions corresponded, as far as is possible in manœuvres of this kind, with the reality. The defenders had at their disposal all the means of obtaining information with which the country is provided, while the enemy had to depend upon his dispatch vessels. The coaling of the latter could only be carried out by means of the transports he brought with him; and for the laying and removal of mine-fields exact and sufficiently stringent regulations were provided. A regulation which in no way accords with what would actually take place, and which, therefore, led to false conclusions, was that which permitted all merchant ships, which were met by the defenders, and whose names were read, to be considered as captured transport ships of the enemy. Here, at least, a settled time for taking possession and fixed rules for disposing of them must be laid down. The rules which regulated actions between ships and torpedo-boats were not very different from those adopted by other countries, and their weakness lay in the peculiar conditions of the channels, which did not permit the tactical carrying out of an action such as one would have wished, and which is possible on land.

Not altogether free from objections was the rule according to which a ship on the ground of a merely superior armament was to be considered the victor over the one opposed to her. If the number of guns of a similar calibre was double, the weaker of the two ships after a fight of one hour's duration was to be considered out of action. But strength co-efficients were allotted to the individual ships, and these were solely fixed by the calibre of the guns on board. As all the ships did not possess guns of the same calibre, it appears as if the co-efficients of strength of the ships in considering their value had been laid down on the basis of guns of equal calibre. This regulation was somewhat arbitrary, as armour protection, speed,

and torpedo armament were not at all taken into consideration. Still the laying down of a simple and hard-and-fast rule, which was easily understood, avoided the difficulty of having to settle points which would have been difficult to determine and involved in doubt. Nor really in accordance with probabilities was the rule which put a ship exposed to the fire of a fortress for fifteen minutes at a distance of less than 4 sea miles, out of action, and a torpedo-boat also under similar conditions if under a mile. As a matter of fact neither a ship nor torpedo-boat would run much danger under those circumstances. Very much to the point and important was the rule that only such guns should be counted which could be really brought to bear against the enemy. The Russians do not seem to set much store by the use of torpedo-nets, as, according to the rules, a ship provided with net protection could be put out of action if two torpedo-boats got within 400 yards of her. The rules for laying down and removing mines were also practical.

With regard to the manœuvres themselves, there are two principal events which claim especial interest. The first is the breaking of the blockade by the armoured gunboat "Grosjaschtschi," and her successful destruction of the base of the enemy at the Moon Sound. The attacking Admiral had left his base with all his force, and there appear to have been no steps taken to secure it against a *coup de main*. This neglect is quite unintelligible, and can only be explained on the supposition that Admiral Kasnakow did not consider it possible for the defenders to break through the blockade. By the operations of the "Grosjaschtschi," whose Commander, Captain of the Second Grade Roshdestwenski, displayed great boldness and foresight, the hold of the enemy upon Hogland had to be withdrawn. As soon as his base was destroyed, the attacking Admiral had to withdraw and establish a new one, or else leave the Gulf of Finland altogether until new reinforcements could reach him. It would appear from the fact of so little notice being taken of this incident as if the object of the manœuvres was rather tactical than to learn strategical lessons.

The second incident of greater importance was the attack by torpedo-boats on the enemy's squadron off Hogland. The attack was completely successful, because no satisfactory look-out appears to have been kept or sufficient measures of precaution taken. A squadron which lies at anchor at night only 12 or 15 sea miles from the enemy is liable to great danger through torpedo-boat attacks, and only very special and pressing reasons should commit a squadron Commander to such a step. In any case, every precautionary measure should be taken in order to discover in good time and defeat any attack. This appears to have been completely neglected, and the result was the loss of two battle-ships.

The torpedo-boats had during these manœuvres several opportunities of acting, but they did not always meet with the same success. It is clearly shown that surprise is a necessary element for the success of torpedo attacks. In this regard, the action of the "Lachta" and "Narwa" against the gunboat "Wichr" points a

lesson, where the first-named were thus suddenly attacked by two 2nd class boats, and in consequence were forced to succumb. Here the nature of the surroundings of the scene of action, which permitted the total concealment of the two smaller boats, made a complete surprise possible.

Note.—The term fiords is used to denote all the channels and waters which lie inside the numerous reefs and islands which extend all along the Finnish coast.

SPEECHES DELIVERED IN THE AUSTRIAN DELEGATIONS ON MEDICAL SERVICES IN THE FIELD, 2ND AND 3RD DECEMBER, 1891.¹

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December 2, 1891.

DR. BILLROTH.

GENTLEMEN OF THE DELEGATIONS,—About a month ago a healthy young man was brought to my surgery; a few hours before the lower part of his left leg had been run over by a heavy wagon. When I took off the temporary bandage, which had been skilfully put on by the officials of the Volunteer Aid Association, a round, somewhat contused wound, with a number of bone-splinters in it, was displayed in the middle of the lower part of the leg.

I said to my audience, “See, this is how a gunshot wound looks, when the projectile has struck the bone.” I sent for a number of bone fractures from the Museum, which I had brought back from the 1870 war, and showed them, so that my pupils could form an idea as to what this kind of injury looks like.

I then went on to speak of the different effects on the bones of the Chassepôt bullet and Prussian elongated leaden bullet. Then I mentioned modern fire-arms and smokeless powder, and remarked that a consequence of the enormously increased penetrative power of the Mannlicher rifle-bullet will be that the projectile, after piercing a bone, will continue its course and hit several more men who happen to be in the line of the trajectory. On the other hand, the force of the old projectiles was generally expended by setting up against a hard bone, so that one could reckon with some certainty on finding the projectile in the wound when a bone was struck. I then added that it is absolutely necessary, in view of the, in all probability, greatly increased number of wounded in a future war, to increase the number of bearers and sanitary troops, since the establishment of these units is altogether insufficient as at present fixed by us.

I noticed that these remarks made a decided impression on my audience, for one’s eyes get sharp after seventy-two terms of academical teaching; but I had no idea that my remarks would have the far-reaching effects which ensued. The next morning there was a report of my clinical lecture in the local papers, as is often the case. But a few days later this report appeared in many foreign papers,

¹ Communicated through the Director-General, Army Medical Department.—Ed.

and cuttings were sent me from newspapers, political as well as medical, from France, England, Italy, and Russia, all of which printed this report, with a request to forward the text of the lecture, which was assumed to have been delivered by me and to be already in print. But I had delivered no special lecture on the subject, but only a few incidental remarks on clinical surgery, nor had I the intention of writing upon the subject, especially as all that I knew about the effects of Mannlicher projectiles had been told me by others. I am still receiving these communications from foreign papers, and as I fortuitously made use of the expression "the projectile of the Mannlicher rifle," it now seems that this rifle is causing a terrible scare before it has ever been used in war.

I am not so foolish as to believe that my individuality is of any weight in this business. But there are certain thoughts and impressions which lie half-formed in the brain of nations, and which only need a partly accidental impulse to make them flash forth; swift, clear, and strong. And the thought in this case is this: "*Are steps taken to better the means of aid to the wounded in proportion to the increasing development of destructive agents.*"

There is good reason for the forcible expression of this thought in these days, when the Army consists of our sons and brothers, our kith and kin.

Before going into this question, we should seek to establish *why* an opinion has gained ground, that destruction will be so greatly increased by the use of these new projectiles and smokeless powder. There is not the smallest doubt that this is counted upon in military circles, for otherwise these matters would not have been submitted to us, nor, indeed, introduced at all.

As to military-surgical experiences of former wars, these have taught us to fear artillery less than soldiers themselves. For we find that the number of men wounded by artillery fire is remarkably small.

I embraced the opportunity of seeing the wounded after the battles of Weissenburg and Wörth, where a large force of artillery and also of mitrailleuses was employed. I also visited all the other hospitals later on, and frequently discussed the subject with my colleagues, and everywhere it was remarked how few were the wounds caused by artillery fire, and that there were none worth mentioning caused by cavalry weapons; cuts and stabs are the greatest rarity in field hospitals. To express it in percentages: about 80 per cent. of wounds are caused by rifle fire, 15 per cent. by artillery fire, 5 per cent. by cuts and stabs. It was formerly said that the effect of round shot and of shell was such that men injured by them died on the spot.

In 1870 the wounds of all the men were registered, whose bodies were thrown into the common graves immediately after the battles, and no new proportions were arrived at.

Hence the attention of military surgeons is directed by these facts principally to small-arm projectiles. What changes will be caused by the new projectiles and smokeless powder? Nobody can say from experience; one can only forecast. One forecast which we hear is, that

things will not be so bad, that people will shoot at such long ranges that they will hit little or nothing ; that the tendency will be to attempt to manœuvre the enemy out of his position. This was just Moltke's aim in 1870, but it could not be done without great battles. In fact, troops are not obliged to change position. Moreover, to manœuvre the enemy out of his position, certain favourable conditions of terrain are necessary, and an at least local superiority. The Germans in 1870 ran up against four great fortresses ; and even if this had been possible without battles, and if the French had had enough troops to attack from outside, the everlasting manœuvring must have come to an end ; it must come to hard blows sooner or later.

As to the struggle between great masses of troops, that is the phase of warfare in which discipline and military culture exercise the greatest effect, and here, perhaps, personal courage is comparatively a very subordinate factor. But just in such cases, where several battalions stand one behind the other, the number of wounds inflicted will be far greater owing to the greater precision and range of the newest projectiles, unless especially favourable conditions of ground afford effective cover to the whole body of troops exposed, even whilst retreating.

Hence, when masses are struggling, the number of severely wounded men, and especially the number of injuries to bones, will be far greater owing to the above-mentioned increased power of penetration.

But, gentlemen, we need by no means assume and found our argument upon the severity of injuries ; that means difficulty of treatment later on. It is the universal custom of war that every man who is slightly wounded, but bleeds freely, goes back to the dressing station. Not the number of severely wounded men, but the absolute number of men who are hit, determines the loss in men to the General, and we can predict that the latter number will, in all probability, be greatly increased by the new weapons, to say nothing of severely wounded men.

The soldier looks upon the incidents of the great mass struggles as a duel. He hardly sees his opponent at all ; he does not shoot at single opponents, but only at the mass ; to a certain degree he shoots only at the enemy collectively. When he has got his knock he goes off to the dressing station. He cannot judge on the spot whether his wound is slight or severe.

You will grant that in 1870 two *brave* armies were opposed to one another, and yet this conduct of slightly wounded men is the custom of war everywhere, and the men cannot, at bottom, be blamed.

As to rapidity of fire, this is, upon the whole, not very greatly increased with the new projectiles. Still, it is virtually increased by the fact that you can see much better and longer where the enemy is. Formerly both sides were wrapped in an immense cloud of smoke after firing a dozen shots, and then they went on firing at each other's smoke. Now they can nearly always see one another distinctly, and can therefore keep up a more accurate rapid-fire, and for a longer space of time.

Now as to the greater length of trajectory of the new projectiles, you may say :—What does that matter—put the dressing stations a few hundred paces further back. If they were, say, 500 paces to the rear before, then they will be 700 or 800 paces to the rear now. Quite so. But for the bearers, who have to carry a heavy man weighing 18 or 19 stone with his kit, upon a stretcher, this increased distance means not only an immense increase of labour, but also makes the journeys much longer in point of time; consequently far fewer wounded can be transported from the battle-field to the dressing station in a given time. Just try this carrying for 500 paces or even 700—800 paces ! (Hear, hear.) It is no joke, and for any length of time absolutely impossible. (Hear, hear.) Now you cannot set up a dressing station, at the regulation distance from the corresponding army corps, &c., in the glare of the sun or in the rain. You must have some sort of cover for it, a house, a ditch, a patch of wood. Not that the surgeons are wanting in devotion in the enemy's presence, but what is to become of the wounded if the surgeons get shot? You may say that they are protected from this by the Geneva Convention. Yes, but what use is the Geneva Convention if your own side retreats towards the dressing station, or the enemy advances, and you find your dressing station in the firing line? This means shifting, hunting up a new place, and the wounded must set to work and find this new place. No one can form a true idea of these difficulties who has not been through them himself.

The increased number of wounded, therefore, must therefore entail a great increase in the number of bearers, which in our Service is at present very small and insufficient. Yes, we must even come to the conclusion that, in future, it will no longer be possible to remove the wounded from the field by means of bearers, unless it is to go on for days together. Hence it will be necessary to place a great number of light carriages, even close behind the line of battle, for the purpose not only of transporting the wounded to the field hospitals, but also to get them away from the battle-field itself, provided that the terrain admits of it.

Before closing these remarks on battles in the field, I cannot help remembering a psychological factor which I merely touched upon before, namely, that the soldier looks upon such a battle as a great political duel, after which there comes a kind of reconciliation, as after duels in private life.

Although in the numerous well-organized hospitals at Mannheim we could manage to separate the French Officers from the German, this was not always practicable with the men. I never observed that this led to any unpleasant feeling amongst the wounded; even the Turcos were quite good-tempered among the Germans. But on one occasion this good temper was rather overdone in my opinion, and left a bad impression on me.

When I arrived at Neustadt, in the Palatinate, on the morning of August 6, 1870, by troop-train, the first train full of French prisoners from Weissenburg was standing in the station. There was a hideous noise going on; German soldiers were singing the "Wacht am

Rhein," there was a train with 100 bellowing cattle on board; the French prisoners had been given so much wine by the good Palatinate people that they were tolerably cheery, and were singing the "Marseillaise." When our troop-train moved on, the French waved to us, with "Bonne chance, messieurs! bonne chance!" (Laughter.)

Smokeless powder will also have marked influence on another form of battle, viz., on the storming of strong localities. Here manœuvring must stop. Every army occupies a certain number of these points and leans upon them in battle, and the possession of them ensures the security of the position. The storming of such places can only be effected by the greatest personal devotion of the soldier.

Here personal courage is the paramount factor, and especially the courage of the Officers. They go in front, and carry their men away with them; by persuasion they will seldom get men to rush into probable and sudden death, be the men otherwise ever so well disciplined.

At the action of Weissenburg, the first of the great Franco-German War, both sides were conscious of the immense moral effect which the victory would exercise upon the further course of the war. The storming of the walls, penetrating at the gates where the bridges were drawn up, the street-fighting, the storming of the strong Château of Geissberg, all this required heroism. In storming the latter point the Colonel fell first, then the Captain, then the First Lieutenant, and only the Fähnrich succeeds in getting into the yard of the château alive. And the French fought like lions also.

I still remember a poor young Second Lieutenant, a native of Paris; he had been shot in fourteen places, and still he stood there with the colour and his sword, till his thigh was shattered and he fell. The same kind of thing happened on the German side.

In these kinds of attacks, the result of using smokeless powder will be that artillery may be more easily disabled than formerly, for the guns in action will cause but little smoke, and the detachments will be more easily and longer visible, and will therefore be in far greater peril.

A third form of combat, and the most frightful of all, is when the outposts deliberately watch for the opportunity of shooting down an opponent, standing sentry. This is *man-hunting*. It is terrible how brutalized the soldier becomes by it. The blood used to freeze in my veins when I heard men, otherwise gentle-minded, talking thus. "I saw red-breeches walking up and down there behind the bushes; first I saw his head, then his knapsack, then his legs; at last I got a fair shot at him, I loosed off, and, you should have seen! he rolled over and over like a shot rabbit!" But if he misses, and is not hidden by smoke, under cover of which he can change his position and even hide himself, red-breeches is sure to shoot back, and the man-hunter rolls over dead.

Thus I am convinced that in *every* form of fighting the increased penetrative power and greater range of modern projectiles, and the use of smokeless (or nearly so) powder, will in future not only cause an increase in the number of wounded, but also in the number of severely wounded men.

Gentlemen of the Delegations, I will now tell you how all War Ministers are wont to answer these views.

First they say : " Great battles are like phenomena of nature, it is impossible to provide for everything that they may bring forth." This I can hardly admit. It is a natural phenomenon impossible of prevision when 5,000 people disappear from the face of the earth, as lately happened in unhappy Japan, in consequence of an earthquake. But we now possess so many good statistical works upon recent wars, that we can very well work out a calculation of probability as to dead and wounded.

Passing over earlier and less accurate works, we have the four-volume work on the American Civil War, and, before all, the classical work of the German General Staff on the war of 1870-71. We can gather very important deductions for the future from the data of the various battles, which give us exactly how many combatants were opposed to one another, the number of dead and wounded, even the names of the non-commissioned officers who fell.

When so-and-so army corps or regiments fight, there are so-and-so many wounded men, at least according to the present style of fighting, or rather, the late style of fighting. Whether or not these proportions will now be changed is an entirely new question.

We will consider solely the proportions as they were in 1870. Merely to indicate how such calculations may be arrived at, I take, as an example, the data of the battle of Gravelotte-St. Privat. Here we find one of the most extensive battle fronts that ever was seen. The battle began at 12 noon, and was over at 8 P.M. The Germans had 5,000 killed and 15,000 wounded. From my 1870 experiences, I reckon two-thirds of the wounded as slightly wounded, only one-third as severely wounded, which must be carried from the battle-field to the dressing station. Many of the slightly wounded men with grazes, gunshot flesh-wounds, in the extremities, &c., could, after bandaging, be quickly shipped off by hospital (railway) trains. There remain, therefore, 5,000 severely wounded.

If we assume as the greatest performance possible, that in eight hours a stretcher with two bearers does the journey from the battle-field to the dressing station ten times—an already highly improbable assumption—we find that 500 stretchers with 1,000 bearers would have been requisite ; but, as the Germans were victorious, they had to take over the French wounded also ; the number of French wounded was less, certainly, for the ground favoured them, and they had a better position, moreover, the Germans were the attacking side, whilst the French could retire from their hills into Metz,—altogether 10,000 severely wounded would have had to have been transported with 2,000 bearers.

This is, as I have observed before, merely an example of the method which may be followed in making these calculations ; for I have already expressed an opinion that all this carrying is in war absolutely impossible of execution. It is clear that the Aid Associations can do relatively little, especially in first line.

With us the Teutonic Order of Knights, with their ambulance

park, are alone permitted to assist in first line. The Maltese Society have organized excellent hospital trains. The Red Cross Society looks after the reserve hospitals. Well, now we are told that country vehicles may be used for transporting wounded, provided they are properly fitted up. I must tell you the following incident:—On the 8th August, 1870, I had been loading up a number of slightly wounded from Wörth—the battle was on the 6th—on the railway trains standing ready for them, and the trains had just left. I was going into the town when I met a cart, driven by an Alsatian peasant; a Turco sat on the box, the Arab always *en pose*, his burnous artistically draped; in the cart lay a Bavarian, a Frenchman, and a Prussian, all badly wounded, and in a most miserable state; round the sides were hung the arms and shakoes.

Since then, when I see a game cart in the autumn, hares hung round the sides, deer, wild boar, and roebuck inside, my ideas are at once associated with this Weissenburg country cart carrying wounded.

The unfortunate men had lain the whole night and part of the following day on the battle-field. They were eventually found in a vineyard, and it was a piece of luck to find some sort of a conveyance to bring them along; for the Alsatian peasants had at that time not been sharpened up, they did not know what war meant. Later on no more carts were to be found, for when once the countryman knows that his horses and cart may be taken from him at any moment, he manages to hide them uncommonly well or send them away a long distance. So this expedient is a very poor one also.

Now, the great objection raised by all superior Officers is this, that such a large increase in the baggage will be necessary, to say nothing of the cost, that it will be no longer possible to move the army as strategy demands.

This I partly admit, but there are many other things which increase the baggage. Take, for example, the telegraph and telephone wagons. With the help of these it will be possible to fetch up the baggage quicker than formerly. Many things have been added to the trains, and there are many more to come. Why should just an increase of the train for the sake of the wounded be put out of the question? Strategy has been forced to gradually change in accordance with these conditions, and it must take these things into consideration. Surely, strategy is not to be the only science to stand still; it must move with the times, and must reckon with given means.

Many things have changed, and many more will change, but what the changes will be we cannot say. If *aéronautics* make further progress, it will come to raining down bombs lightly cased, say with aluminium, upon the combatants; or imagine electrical science so far advanced that one can dart down lightning on troops from a balloon. This is by no means absolutely impossible; these are no exaggerated fancies. Strategy will have to reckon with such things also.

I can by no means admit that it is impossible to make changes in this direction too. The thought which now inspires the mind of people universally, and has become so well-defined that it must be

reckoned with, is that help to the wounded must keep pace with the increased power and great development of ballistics.

There are still two points which I should like to touch upon. First, the illumination of the battle-field at dusk and at night by means of the electric light. I regret that up till now we are still without the necessary apparatus. The idea of lighting up the battle-field in sections by great reflectors to facilitate search for the wounded has been spread far abroad from Vienna, thanks to Baron Mundy's untiring energy. He has spoken on the subject in London, Geneva, and latterly in Frankfurt, has demonstrated the idea, and France, England, and Germany all possess these apparatus; we alone are without them. I wish, therefore, that the higher military authorities would turn their attention to the subject.

Finally, I should like to mention a point which my hon. colleague, Dr. Heilsberg, has already touched upon in committee on the Budget, viz., *the question of re-establishing a military medical academy*. All other European Powers have such academies, and, as we copy everything else, why should we not copy them in this matter, which is of such great importance? It was formerly stated that the Joseph Academy had to be abolished on financial grounds. *That was a great material mistake, a very great mistake.*

The makeshifts adopted in place of it have proved too insufficient. Sums have been set apart to enable medical students to study under the condition that they became military surgeons.

Further, two army surgeons annually are sent to attend our bedside lectures, so that we may initiate them in the new methods during the year, and this we, of course, do with the greatest willingness. But these are measures which can in no way replace education at a military medical school.

There is a totally different factor which must be considered in this case, and that is, military *esprit de corps*, which must be fostered in an army medical school, which naturally exists there, and which afterwards is much more difficult of creation. This is quite natural. Without military *esprit de corps*, the army surgeon is further removed from the corps of Officers than would be the case had he been educated at a military institute. The consequence is that the doctor does not hold the position he should wish, compared to the Officer, and hence a *circulus vitiosus* in which one and the other move.

Hence there can be no doubt that the establishment of an army medical academy is also of the greatest importance to us.

I have already made proposals on this subject; I have published various articles about it, and have shown that the question of expense is not so very great, for in my opinion it is now by no means necessary to establish a complete medical faculty. I have proposed that professors' chairs should be established in practical subjects and in pathological anatomy only, and that students should not be admitted until they have passed the first examination in anatomy, physiology, &c. This will be all the easier now, since a similar regulation is going to be issued with the revised orders for examination for the

Civil Service. Medical students will not be admitted to bedside lectures until they have passed the first qualifying examination in anatomy and physiology, for it has been found that many did not attend lectures under pretence of preparing for the examination, and therefore missed the all-important part of the subject, viz., practical instruction.

This foundation of an army medical school is, in my opinion, quite feasible, and does not entail great expense. But other conditions are indispensable if such an institution is to be really of use; and the most important condition is that special material for study should be provided. It is quite useless to set students to work upon the usual clinical material. And of what does the latter consist? It is always the same, caries, tuberculosis, cancer, and other new subjects. There are comparatively few bodily injuries. Now, in my opinion, special measures should be taken in such army medical schools to ensure a supply of the material that the army surgeon needs, and that is bodily injuries.

I grant that gun-shot wounds cannot be produced, but something can be done; *e.g.*, a horse may be hung horizontally, and then shot at twenty times or so; then students may be shown how projectiles act upon the bones, the course the bullet takes, and so on.

But the fundamental part of the subject is the study of the further course of injuries, and lesions do not differ among themselves to such an extent as not to afford some points of comparison with gun-shot wounds. The material in bodily hurts is therefore the most important desideratum for this kind of institution.

An inquiry upon this subject was opened by his Excellency Count Bylandt, late Minister of War. Everything seemed to be going on swimmingly, but you are aware that the thing failed owing to the opposition of the Hungarians——

PRESIDENT (interrupting): I take the liberty of reminding the hon. member that it is past 2 o'clock, and that his Excellency the War Minister is expected in the Hungarian Delegations, &c.

Dr. BILLROTH: I apologize, I did not notice the time—(continuing)—I have nearly finished, and would only remark that in my opinion, confirmed by events, the abolition of the Joseph Academy was not only a great material mistake, but also a *great political mistake*. I am convinced that ways and means may and must be found to correct this error, and I hope that his Excellency the Minister of War will in future direct his efforts to the substantial correction of it. In conclusion I can only say, “*Ceterum censeo, Josephinum esse reconstruendum.*” (Cheers.)

December 3, 1891.

F. Z. M. FREIHERR V. BAUER (Minister of War).

I was called away yesterday, and was therefore unable to fulfil my obligations. I now do this by conveying my warmest thanks in the

name of the War Ministry to the hon. member, Dr. Billroth, for the humane and exhaustive representation of the somewhat gloomy pictures which he has afforded us. All these pictures are expressive of a wish to alleviate the horrors which we must expect in war.

These horrors are inevitable, they are the terrible side of war, but it is the congenial and real duty of every humane man, and especially of a war administration, to alleviate these horrors.

If I may be allowed to select from the exhaustive speech of the hon. member those points which concern the war administration, and which are to create an impulse for future progress, these points would be four in number, as follows :—

1. A desire for an increase of the bearer-personnel as the means of transporting the wounded from the fighting or firing line to the place of aid.

2. An increased establishment of vehicles, in order to secure communication with establishments in rear.

3. The introduction of mobile illuminating apparata, to provide for the lighting up of the battle-field at night.

4. Establishment of the Joseph Academy.

As to the first point, I do not altogether believe that a material increase of bearers will afford us the desired remedy. It must be laid down as a postulate of aid to the wounded, that a wounded man must be properly attended to within twenty-four hours. This is what must be aimed at and kept in view, irrespective of the self-help which a man is capable of if slightly wounded, by making use of the small packet of bandaging material which he carries with him.

The thing to be done is, then, to get a man back from the fighting or firing line to the place of aid; this is the first of the places where the regimental surgeons are assembled to afford assistance. Conditions of ground must here alone decide what the bearers can do in the way of carrying to and fro with the stretcher they have at their disposal.

Now if we increase the number of bearers and expect them to go backwards and forwards in this way, they will, every man of them, be shot down, unless the conditions of ground are exceptionally favourable. They are worse off than the men in the firing line; *they* seek cover, and if they cannot find it they make it, if the ground admits. To do this they have their Lünemann spades to entrench themselves with, in accordance with our regulations.

Men wounded in the firing line are either slightly wounded, so as to be able to go back without assistance, or so wounded that they must be led back to the place of aid, or, finally, severely wounded, in which case they must be carried back on stretchers.

As to the first two classes, I have learnt by experience that, unless absolutely incapacitated from further duty, they preferably avoid the way to the dressing station, for this way is far more dangerous to them than remaining near the fighting line. However that may be,

we have, until now, organized a bearer-patrol of three men per company. *i.e.* per sub-division. These are the men who carry the stretchers; they are instructed during peace time in first aid, and are provided with the means of affording the wounded man a temporary relief. All these arrangements are thought out and considered in every light. The question is, whether a *material* increase of these bearers will answer the purpose.

In any case, I reserve to myself the task of having the subject thoroughly inquired into. I accept with great pleasure the suggestions of the hon. member, who is able to speak as an authority on the subject. But, on the other hand, our military measures must be kept within certain maximum limits, and this applies to a material raising of the bearer establishment.

I should like to add that the best time for getting the wounded away from the firing line is when position is changed, either in advancing or retreating.

When position has been changed, when by the advance such a distance from the troops in front has been gained as to at least lessen the danger, then is the time for the bearer-patrols (four per battalion) to begin their work and search a space dependent upon conditions of ground, say about 800 paces per battalion.

The practical training of the bearers in these duties may be seen going on every summer at the greater manœuvres. Every effort is made to make their task clear to them in peace time. In winter they are trained as far as possible in practical medical duties on a small scale.

I hope and wish that these means will suffice, and would add that the distance (to the rear) of places of aid and dressing stations, as given in figures, is by no means to be adhered to under all circumstances. A place of aid is properly situated when under cover and as near as possible to the firing line. All regulations on this subject are kept as simple as possible.

This also holds good with reference to the distance of the places of aid from the troops in action. The distance is by no means the ruling factor, any more than the distance given to be observed by the reserves from the fighting line.

As to the second point, *viz.*, the increase of vehicles and establishment of communication with the rear, precise and binding instructions are laid down in our Regulations for Medical Services. These instructions are, that when an action commences, all available vehicles of whatever kind, empty regimental provision and meat wagons, empty supply-column wagons, vehicles otherwise requisitioned, ambulances of medical establishments in rear, &c., are to be brought up for transport of wounded, in order to satisfy requirements as far as possible. This order is categorically laid down in our service, and I think I have shown that everything that can be done in this direction, will be done.

The third point refers to the illuminating apparatus for lighting a space where fighting has been going on and where dead and wounded are still lying, or, in other words, the battlefield. This is a humane

measure which no one views with disfavour, and many experiments have been made in this direction. I was present at Baron Mundy's practical experiment. On that occasion a brilliant, staring illumination was obtained of points where the light fell, but, at the same time, I observed that the deeper shadows cast by swells of ground were so black, that the men were not discovered, and recourse had to be taken to lanterns or torches. And all this happened in a place, in the like of which we shall not fight, viz., in the Trabreunplatz in the Prater.

At that time, so far as I remember, I proposed that a sham-fight should be held on the Galizyn Berg, so that conditions of ground might have their proper effect; but I believe this was not done.

Further, the introduction of illumination wagons would entail an increase of baggage.

Now, an increase of baggage is of itself a very objectionable factor. The baggage gives us a vast amount of trouble, and if you remember the difficulty of getting the baggage columns along, you will see that one must literally reckon with every single wagon. This circumstance would not of itself prevent us from considering the feasibility of introducing such wagons, but the question must first be decided whether these wagons could in all cases, and especially at the right time, be brought up to the place where they are wanted. We need further experience on this point. Foreign Governments, so far as I know, have also only got to the experimental stage, and this service has nowhere been introduced as a definite measure. Experiments and trials have been made with wagons, and I will do the same. As soon as we attempt to introduce this kind of apparatus, the question of building a suitable carriage at once comes to the front, and it is a very difficult one.

There is no want of lighting apparatus. The problem is to fix the heavy apparatus on a wagon which admits of easy transport, and can be brought up on any kind of ground. We have among our transport material a certain kind of heavy wagon which we still use, but is not sufficiently mobile, so we must think of some lighter conveyance.

I reserve the privilege of informing the House further on this matter when I have studied it and gained further experience in the matter, and when foreign experiences are at my disposal; for we profit by everything and everywhere we possibly can.

Finally, the question of the Joseph Academy has been touched upon. Everyone knows how the matter stands. I feel greatly flattered by the honour which has been done me in assuming that I shall bring it to a satisfactory solution, but whether I shall succeed in doing so is another matter.

I think I have now expressed the views which I entertain with reference to the very admirable speech delivered by the hon. member Dr. Billroth, and can only repeat, on behalf of the War Administration, the expression of hearty thanks for his solicitude, which is solely directed towards alleviating all the horrors which we must expect under all circumstances in time of war. (Loud cheers.)

December 3, 1891.

COUNT FALKENHAYN, Chairman of Financial Committee on Army Estimates.

Gentlemen,—I hope you will allow me a few words in order to express my views on the subject of the debate on Clause 18, certainly one of the most important and interesting which has taken place in discussing the War Estimates. We have deduced two precepts from the so comprehensive and interesting speech delivered by the renowned—I may say, not merely surgeon, but also—War Surgeon Billroth. The first precept which I have laid to heart in my present capacity, and yet as an outsider in this subject, is the intimation that, in a future war, the means of aid to the wounded provided and ensured by the State will in no case suffice. Gentlemen, they have never sufficed in past wars, for it lies in the nature of things, and these means will not suffice in future wars, even if the War Ministry, as his Excellency the War Minister has promised, takes pains to add to them and strengthen them. But the lesson I have deduced on this point, but lightly touched upon by the hon. member, is the importance of encouraging those societies which prepare in peace to afford voluntary aid in time of war; I mean those organizations which have been formed in all countries under the sign of the Red Cross.

Gentlemen, it is natural that in a long period of peace the attempts at organizing such means of aid should gradually grow weaker and weaker, for the terrible picture, as painted by the experienced hand of a man who knows war, for our benefit, is not before the eyes of the world in time of peace.

May the picture, painted for us yesterday in gloomy but faithful colours, contribute towards procuring these organizations that support and encouragement on the part of the nation so essential for its own sake, since sons and brothers are concerned.

The second point has to do with a subject which, in latter years, has not only been mentioned, but also discussed, in every Committee of the Delegations, as also in the present one. The general opinion is that the abolition of the Joseph Academy was a mistake, and that there is pressing need of the re-establishment of an army medical school, especially for surgical purposes.

His Excellency the War Minister, in his to-day's speech, only gently hinted at the reasons which, until now, have prevented the re-establishment of this academy, represented as a necessity from a military point of view also. Political, State reasons are said to form the obstacle.

Gentlemen, can it be, shall it be, that such reasons shall decide, when it is the interest not only of the common Army, but also of the whole population of the Empire, that our men should, in time of war, be rescued and cared for by those who would be trained in these duties at such an institution? I hope that this question may shortly be answered in a favourable sense by the Delegations.

NOTICES OF BOOKS.

Illustrations of Field Exercises by the Three Arms, of Exercises in Minor Tactics, and War Games. With Maps. By Brigadier-General H. M. BENGOUGH, C.B., Commanding Bangalore Division. London: Gale and Polden. Pp. 86. Size $9\frac{3}{4}'' \times 6\frac{1}{2}'' \times \frac{3}{4}''$. Price 5s., post free.

These are illustrations taken from exercises carried out under General Bengough's superintendence, at Bangalore, and both interesting and instructive is their perusal. As in them are included two rear-guard actions, it may be as well to take advantage of the opportunity to point out that, under ordinary circumstances, minor operations of this class at field exercises are often worthless, owing to the fact that where both sides are composed of troops at the same station it is very difficult to prevent the attacking force knowing the exact strength of the rear-guard to be attacked. The object of a rear-guard is to delay, and the most potent aid for this is deception of strength. But when the pursuer who knows his adversary's strength finds the rear-guard on an extensive front, he knows this is mere "bunkum;" if he finds himself strongly opposed, he similarly knows that the flanks are within easy reach for a turning movement. General Bengough introduces a somewhat novel application of *kriegs-spiel* by selecting for an exercise (not a game, General Bengough) a portion of the Aldershot map which offers a somewhat similar topographical situation to that of some battle which has actually been fought; and by afterwards comparing the *kriegs-spiel* operations with the actual operations. As we read the lecture and discussion on the exercise illustrative of Ziethen's defence of the line of the Sambre in 1815, we cannot help feeling how deeply grateful to Providence ought all military critics, historians, and instructors to be for causing the Waterloo campaign. Whom would they have had to belabour if that campaign had not been fought? Still both Commanders were men of some ability and power, and doubtless they rest peaceably in their graves in spite of the seventy-five years of wordy castigation which has been inflicted on them. One comfort our poor ignorant soldiers in England who are being everlastingly told that "India is the place for real soldiering" will derive from reading General Bengough's *Illustrations*—our brethren in India do, at manœuvres, just as unwise and silly things as we do in this country.—L. A. H.

Handbook of Artillery Matériel. By F. C. MORGAN, Major R.A. With Plates and Index. Fifth edition. London: Clowes and Sons, 1892. Pp. 138. Size $7\frac{1}{4}'' \times 5'' \times \frac{3}{4}''$. Weight under 10 ozs. Price 5s. 6d.

Major Morgan is an "Armament Major;" he has been Instructor in Gunnery at the School of Gunnery, and Inspector of Warlike Stores. His work is used as a text-book for Officers qualifying for promotion in subject "Artillery," and also by the gentlemen cadets of the Royal Military Academy. With these credentials and the book having been recast and brought up to date, it would be difficult to add to the recommendations for acceptance it already possesses.

Field Fortification, with Examples and Answers. By H. TURNER, late Royal Artillery. London: Swan Sonnenschein, 1892. Pp. 210. Size $7'' \times 5'' \times 1''$. Weight under 1 lb. Price 6s.

The title chosen for this work is hardly correct and is a little misleading. The book should rather be called "Questions and Answers on Field Fortification."

Montrose. By MOWBRAY MORRIS. London: Macmillan. 1891. "English Men of Action." Pp. 229. Size $7\frac{3}{4}'' \times 5\frac{1}{2}'' \times \frac{3}{4}''$. Wt. under 1 lb. Price 2s. 6d.

How easy is now attainable a knowledge of our national history of past times. Whilst times give birth to leaders, leaders influence the times in which they live. In this valuable series both sides of the subject are well illustrated. Very clear is this admirable account of the great Montrose, and in the final chapters are touches of pathos that remind us how akin we become in sorrow, even to the greatest men of the past. Mr. Morris has given us no dry history, but a living portrait.

Trafalgar: An Historical Novel. By D. PÉREZ GALDÓS. 7th edition. Madrid: 1888. Price 1s. 7d.

Historical novels which deal with stirring national episodes, treated fairly and truthfully, with a due regard to care as to historical details, form a very wholesome class of literature, infinitely preferable to the mawkish sentimental novel which is so much in favour in the present day.

Señor Galdós, the eminent Spanish writer, is noted as a prolific and justly popular author of this class of book, of which the one which I propose briefly to notice now is a worthy type. "Trafalgar" was written by him as early as 1873, and has been published both as an elaborate illustrated work costing some 12s. to 14s., and in a cheap paper-bound form, as above.

In order to put his description of this famous battle into a popular form, the author writes it in the first person, the hero being supposed to have been an eye-witness of the action, and together with what appears to be an impartial description of this great disaster in Spanish and French history he interweaves an amusing and harmless fiction.

Space will only permit of the briefest sketch of the story.

Our hero, born at Cadiz, escapes from the tyranny of an uncle and takes service with a distinguished retired naval Captain, who, in 1805, is seventy years of age. This Officer, having heard in that year from his friend, Admiral Churrua, that the Spanish Fleet is about to put to sea against the English, is fired by enthusiasm, and, incited by a patriotic old Spanish sailor, called Mareial (who has lost a leg in the service of his country), eventually decides on joining the Fleet, and our hero, his uncle, and Marcial, after various vicissitudes, elude the vigilance of the female relatives of Don Alonso (the master), and succeed in getting on board of the "Santissima Trinidad" (a four-decker with 140 guns), the largest ship in the Spanish Fleet.

Admiral Churrua, who is described as a slight, delicate-looking man of forty-five, with a heart as large as his intellect, commands the "San Juan Nepomuceno." The Spaniards are allied with the French, who are commanded by Villeneuve, and this Admiral, contrary to the wishes of his Spanish colleagues, decides to go out against the English, being impelled by the orders of Bonaparte and believing that with the twenty-four French and fifteen Spanish ships under his command they ought to prevail. Churrua wishes to remain in the Bay of Cadiz and force the English to blockade the port, as he recognizes the superiority of his enemy. Villeneuve prevails, however, and, on the 19th October, 1805, we find all three of our heroes embarked and the fleet moving out of Cadiz Bay.

Mareial, who knows all the principal vessels, informs the others that Admiral Gravina commands the "Principe de Asturias," Villeneuve the "Bueentaur," and Alava the "Santa Ana." Villeneuve's plan was to divide the squadron into four divisions: the vanguard, under Alava (seven ships); the centre (seven), under himself; the rear-guard (seven), under Dumanoir; and the reserve, of twelve, under Gravina.

On the night of October 20th the enemy's lights are seen, and next day thirty-three ships are counted, formed in two columns.

A general action was now imminent.

The Allied Fleet formed a long line, and Nelson seemed bent on trying to pierce the line between the centre and rear-guard.

The "Bueentaur" now signalled to "wear together" (*virar en redondo*), a difficult manœuvre and badly done.

It was noon (Oct. 21st). The English advanced to attack in two divisions, one led by the "Victory" (Nelson) against the "Trinidad," the other by the "Royal Sovereign" (Collingwood). The following table shows the positions of the Allied Fleet and the direction of the English attack (S. = Spanish; F. = French):—

		"Neptuno" (S.)	} Vanguard.
		"Scipion" (F.)	
		"Rayo" (S.)	
		"Formidable" (F.)	
		"Duguay-Trouin" (F.)	
		"Mont Blanc" (F.)	
		"Asis" (S.)	} Centre.
First Division (Nelson) "Victory" →		"Augustin" (S.)	
		"Héros" (F.)	
		"Trinidad" (S.)	
		"Bucentaur" (F.)	
		"Neptune" (F.)	
		"Redoutable" (F.)	
		"Intrépide" (F.)	} Rearguard.
		"San Leandro" (S.)	
Second Division (Collingwood) "Royal Sovereign" →		"San Justo" (S.)	
		"Indomptable" (F.)	
		"Santa Ana" (S.)	
		"Fougeux" (F.)	
		"Monarca" (S.)	
		"Pluton" (F.)	
		"Bahama" (S.)	} Reserve.
		"Aigle" (F.)	
		"Montañas" (S.)	
		"Algeciras" (S.)	
		"Argonauta" (S.)	
		"Swiftsure" (F.)	
		"Argonaute" (F.)	
		"Ildefonso" (S.)	
		"Achille" (F.)	
		"Principe de Asturias" (S.)	
		"Berwick" (F.)	
		"San Juan Nepomuceno" (S.)	

Seeing that Nelson was about to cut in between the "Bucentaur" and "Trinidad," the Commander of the latter gave orders to bring her to, to allow the former to come up, which had dropped behind. It became evident, from the way this manœuvre was executed, that the crew were inexperienced. Many of them were levies and devoid of patriotism. The soldiers were sea-sick. The "Royal Sovereign" engaged the "Santa Ana," and the "Victory" the "Redoutable," and, being repulsed, came up to windward of the "Trinidad," who gave her a broadside of fifty guns. The "Bucentaur," which was astern of the "Trinidad," also opened fire on the "Victory" and "Téméraire," and it looked as if the "Victory," which had lost her mizen-mast and rigging, would fall to the "Trinidad." The "Téméraire," however, by a clever manœuvre, interposed and saved her consort, and, taking advantage of an opening, ranged up on the port side of the "Trinidad," and delivered a broadside on the quarter which had hitherto had an immunity. The "Victory" fell off to leeward, the "Neptune" (English) took her place, and the "Trinidad" and "Bucentaur," overwhelmed by fire and heroically resisting, were nevertheless doomed.

The sufferings on board the "Trinidad" are vividly described. The "Bucentaur"

struck her flag, and this surrender of Admiral Villeneuve had a bad effect on the rest.

The "San Augustin" and the "Héros," assisted by the "Rayo" and "Neptuno," continued the struggle. At this time a fearful explosion was heard, which for an instant drowned the sound of the 1,000 guns of the contending fleets. This was the "Achille" (French) blowing up. The "Trinidad," which was making water rapidly, was forced to strike, and an English prize crew boarded her, and by dint of great exertions kept the water under. From them it was heard that Gravina had retired with some vessels; the four French ships, viz., the "Duguay," "Mont Blanc," "Scipion," and "Formidable," were the only ones which did not come into action; Gravina retreated in the "Principe de Asturias," and was given chase; the "San Ildefonso," "Santa Ana," "Nepomuceno" (Churruca killed), "Bahama" (Galiano killed), and "Montañas" (Alcedo killed), were all taken as prizes.

The English prize crew on board the "Trinidad" described the heroic death of Nelson, whom the author justly eulogizes.

Next day (October 22) the English ship "Prince" tried to tow the "Trinidad," hoping to get her to Gibraltar; the English crew worked day and night at the pumps, but in vain. The water gained to such an alarming extent that a hurried rush had to be made to the boats of the "Trinidad," "Prince," and neighbouring vessels. The wounded were first seen to, but many were left on board, there being no time to help them. The sea ran high and was dotted with ships, mainly English, bent on seeking some ports of shelter. Many French and Spanish ships were observed, mostly dismantled and many in tow of English ships. One of these was the "Ildefonso." Our heroes were in a launch, and gained the "Santa Ana" (112 guns, Lieutenant-General Alava), but now mastless and rudderless and in the hands of an English prize crew. She had borne a splendid part in the battle. Supported by the "Fougeux" (F.) she engaged the "Royal Sovereign" and four other English ships. The "Royal Sovereign" was the first to be put out of action, and Collingwood transferred himself to the "Euryalus." The combat was terrible. After Alava was wounded, the Commander, Gardogui, 5 Officers, and 97 men killed and 150 wounded, the "Santa Ana" was forced to yield. The "Nepomuceno" was also captured. Our hero heard on board the "Santa Ana" details of Gravina, who fought the "Principe de Asturias," with the help of the "Neptune" (F.), the "San Ildefonso" and the "San Justo" against the "Defiance" and "Revenge," later reinforced by the "Dreadnought," "Thunderer," and "Polyphemus." Finding his ship absolutely disabled, Gravina signalled to retire, and, accompanied by the "San Justo," "Leandro," "Montañas," "Indomptable," "Neptune," and "Argonauta," made for Cadiz, having to abandon the "Ildefonso," which was captured.

As has been said, Churruca died on board the "San Juan Nepomuceno." He had all along been opposed to the plan of Villeneuve. On going into action he harangued his crew, after calling on the Chaplain to give them all absolution, and told them that he could now promise salvation to all who died for their country, and he would shoot anyone who failed in his duty. He knew, directly he heard the first order given by Villeneuve, viz., to "wear together," that a grave fault had been committed, which Nelson would be safe to take advantage of. The "Nepomuceno" was, as our diagram shows, at the extreme end of the line. The "Santa Ana" opened fire on the "Royal Sovereign," and gradually all the vessels were drawn into the combat. Five English ships were directed against the "Nepomuceno," but two of these passed on and Churruca had to engage the remaining three. He maintained this unequal fight heroically until 2 P.M., when the English were reinforced. The two vessels which had first come up and passed on now returned, and the "Dreadnought" closed with the "Nepomuceno." The odds were now six to one. Churruca fought with the greatest coolness, economized his fire, and paid particular attention to the laying of the guns. He seemed to bear a charmed life; but at last, after personally laying a gun with the best effect, a round shot struck him in the leg. Though fearfully wounded, and knowing that it was all over with him, he cried out, "This is nothing; keep on firing." He combated death to the utmost; at last he was forced to call for his second in command, Moyna, but was told he was dead. He then called to the Officer commanding the first battery, who, though seriously wounded, took command. Panic soon seized the worn-out crew; an

attempt was made to get under way and follow the "*Principe de Asturias*," which had given the signal to retire, but the "*Nepomuceno*" could not answer her helm. Notwithstanding the ruin and destruction aboard her, none of the six English ships would attempt to board her. Churruca, now in the last agony, ordered the flag to be nailed to the mast and that no surrender should be made while he lived, which was for a very short while longer. He never lost consciousness or complained, and tried to the last to conceal the gravity of his state. He thanked the crew for their heroism, addressed a few words to his brother-in-law, Ruiz de Apodaca, and after a message to his young wife and a prayer to Heaven, he passed away with the tranquillity of the just, and though without the satisfaction of victory, still unconquered. The "*San Juan*" then struck and a dispute ensued amongst the English Officers of the six ships as to who should have Churruca's sword, each claiming that the "*San Juan*" had struck to his particular ship. The question was therefore put to the temporary Commander of the "*San Juan*" to decide. His reply was "To all: for the '*San Juan*' would never have surrendered to any single vessel."

The English deplored the death of Churruca, one of them saying, "Men such as he ought not to be exposed to the inevitable risks of a battle, but should be preserved to forward the science of navigation"; and every possible honour was paid to the body of the hero.

On the morning of the 24th, D. Ignacio Alava, the wounded Commander of the "*Santa Ana*," seeing some Spanish vessels coming towards him from Cadiz, succeeded in getting his crew to rise against their temporary masters, and in turn made them prisoners. Two English ships engaged her and the three Spanish ships which had come to her assistance, but had to draw off. The French frigate "*Thémis*" tried to tow the "*Santa Ana*," while the other three, the "*Rayo*," "*Montañas*," and "*Asis*," made sail to try and recapture the "*San Juan*" and "*Bahama*," but had to desist.

The "*Santa Ana*" was nearly got to Cadiz when a storm arose, and she and her consort which was towing her could not make the harbour. The badly wounded (including Marcial and our hero in charge) were transferred to the "*Rayo*," which ultimately was driven ashore. Marcial refused to leave the wreck and perished in her. This character is one of the best in the book, and is forcibly delineated, but space does not admit of noticing his amusing and caustic nautical language and souvenirs. Our hero was washed ashore, and heard from a sailor of the "*Bahama*," who was picked up, that that ship, after encountering severe odds, lost her Captain, Galiano.

Eventually our hero got safely to Cadiz and there heard of the fate of the rest of the squadron.

The "*Trinidad*" (140), "*Argonauta*" (92), and "*San Augustin*" (80) sank. The "*Principe de Asturias*," under Gravina, with the "*Montañas*" (80), "*San Justo*" (76), "*San Leandro*" (74), "*San Francisco*" (74), "*Asis*," and "*Rayo*" arrived at Cadiz on the 22nd, but, as we know, they returned to try and retake some of the captured vessels. The two last were lost on the coast, as were the "*Monarca*" (74) and "*Neptuno*" (80).

The "*Bahama*" (captured) was lost before getting to Gibraltar. The "*San Ildefonso*" was taken to England, and the "*Nepomuceno*" was, for a long time, kept at Gibraltar as a relic. The "*Santa Ana*" got safely to Cadiz after all.

The French lost as many ships as the Spaniards, and, with the exception of the four French ships which retired with Dumanoir without firing a shot¹ (a lasting reproach), they fought heroically. Villeneuve, wishing to repair his error, resisted desperately to the end, but was taken prisoner to Gibraltar. Some French ships

¹ Just after writing the above, by a singular coincidence, the "*Times*" of 26th January, 1892, had the following paragraph, which gives the subsequent history of the "*Duguay-Trouin*," which "ran away, and lived to fight another day," and is still doing good service at Plymouth as a training ship.

"The only line-of-battle-ship which remains on the list of the Royal Navy, out
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got away with Gravina. Others were captured, and many perished on the coasts. The "Achille" blew up.

The story now is virtually ended. There is nothing in it to which the English can take exception. Due credit and honour is given to Nelson and his brave Captains and crews. Whether the relation of the battle is in strict conformity with the version as known to us, I leave to naval historians to judge; but I think we may all admit that a very readable and entertaining story has been made out of a national episode which, whilst one of the most glorious in English history, is justly claimed by Spain as the reverse of inglorious to the valour of the Spanish Navy.

A history of such an episode as the battle of *Trafalgar* should be ever green, and this must be my excuse for reviewing now a work which was written nearly twenty years ago, and which, I have no doubt, was well reviewed when it first appeared.

J. C. D.

Rulers of India. Mádhava Ráo Sindhia, otherwise called Madhoji. By H. G. KEENE. Oxford: Clarendon Press, 1891. Pp. 207. Size $7\frac{3}{4}'' \times 5\frac{1}{4}'' \times \frac{3}{4}''$. Weight under 1 lb. Price 2s. 6d.

An excellent history, drawn from the best authorities, of the Mahrattas and Scindia, their celebrated ruler, during the latter half of the 18th century, including a very clear explanation of the origin of the jealousy existing up to the present period between the two great divisions of the race ruled by Scindia and Holkar respectively. The volume also contains a clear description of the intrigues and complications between the Mahrattas and the British during the period under review, the result being that in 1782 the East India Company were recognized as the paramount power in the Peninsula of India. This work well repays perusal, and should be found in every regimental library now that the Army is daily becoming better instructed as to the real position we hold in relation to the great Native Powers in India.

M. G.

of about fifty vessels of that class taken by us from the French between 1793 and 1815, now forms part of the Boys' Training School at Devonport. The establishment consists of two ships—the 'Lion,' a two-decker, which was built at Pembroke in 1847, and which gives its name to the whole, and a vessel which is officially described as 'late "Implacable."' In the year 1805 this 'Implacable' was the exceptionally fine French 74, 'Duguay-Trouin.' Under Captain Claude Touffet, she fought at Trafalgar, but escaped with M. Dumanoir's squadron. A fortnight later the squadron was met by one under Sir J. R. Strachan, and, after a gallant and bloody action, was taken. The 'Duguay-Trouin,' which lost her Captain and 150 killed and wounded, was carried into Plymouth and added to the Navy as the 'Implacable.' As she is our sole surviving French prize of the line, and as, moreover, with the single exception of the 'Victory,' she is probably the oldest battleship of any kind now belonging to us—the 'Canopus' and 'Foudroyant' having been disposed of—it has been suggested that, upon her release from her present duties, she shall be preserved at Plymouth, as the 'Victory' is at Portsmouth, as a memorial of the naval architecture of the days of our greatest maritime glories. The 'Implacable' has not, of course, had so distinguished a career as the 'Victory;' but, while in our Navy, she was concerned in the taking of the Russian 'Sewolod,' 74, in 1808; in the capture of a number of Russian gunboats off Hango Head in 1809; and in the operations on the coast of Syria in 1840, for each of which services a medal was afterwards granted."

J. C. D.

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Friday, February 19, 1892.

LIEUTENANT-GENERAL THE HON. W. H. A. FEILDING, Inspector-General of Recruiting, in the Chair.

THE TELEPHONE AT HOME AND IN THE FIELD.

By Major C. F. C. BERESFORD, R.E.

THE discoveries of science that are crowding up the close of the nineteenth century have elbowed the telephone out of the company of novelties, and reduced it to the level of the common-place, found wherever men are busy, and where economy in time and labour is a consideration.

There is, always has been, and possibly always will be, a certain prejudice in favour of the human voice as the medium for intercommunication, but, till within the last decade, distance had, perhaps happily, limited its sphere of action, and that, in spite of the efforts dating from the darkest ages which have constantly been made to supplement the power of speech.

Written signs sent by messenger, visual signals, acoustic signals, the electric telegraph, all have had their turn, but the instantaneous transmission of sounds and spoken words, over distances measured in miles and hundreds of miles, has been reserved for our day.

There may be drawbacks to the discovery, for however well established the fact may be that the more perfect the means of communication, so the greater are the chances of success in any operation of peace or war, it is not so well established that the human voice is, under all circumstances, the medium most to be desired for arriving at a satisfactory result. Experience, in fact, may have taught some of us that any contrivance for transmitting the voice itself might very easily pass from a blessing into a curse, and that, while considering to what use we could put the telephone, we should not shut our eyes to its possible abuse.

Origin.

The telephone may be said to have been invented in 1876, by an American gentleman, Professor Graham Bell.

In 1877 Mr. Preece, well known to all of us as the author of the latest telephonic triumph, the London-Paris Telephone Line, having been to America, brought back some of the instruments, and, in the same year, exhibited them to the Officers of the Telegraph Troop, in the R.E. Theatre at Aldershot.

This was the birth of the military telephone.

General Description.

It was then in its simplest form, namely, a straight, permanent magnet, on one pole of which was fixed a coil of wire, with a soft iron core, and a mouth-piece fitted with a thin iron diaphragm.

No battery was used, and the instrument served for both sending and receiving.

In this form it gave feeble results, and was at first considered as little more than a toy, not of value for military purposes.

This first opinion had reference to its "talking" powers and not as a transmitter and receiver of Morse signals, in which line, to some at least, it gave promise of future success.

The Microphone.

Following close upon the telephone came the great invention of Professor Hughes, which at once opened the door to its practical employment. This was the microphone.

The microphones with which we have to do in the Service consist of pieces of carbon placed in loose contact in the circuit. The vibrations of the carbon caused by the voice produce corresponding variations in the current of a battery attached, and the loudness of the transmitted sounds depends on the amount of these variations.

A small battery is a necessary adjunct of a microphone.

"Calling" Apparatus.

In addition to the telephone and microphone, we also require a means of calling the attention of those at the distant end of a line. There are various ways of doing this. But in dealing with military movable telephone systems, the chief difficulty is to devise an efficient "call" apparatus which will not involve the use of a battery or any bulky or delicate machinery.

The call may be made either by bells, by a vibrating sounder, or by the reproduction of various sounds in the distant telephone, using for the purpose, reeds, whistles, or vibrating instruments.

The bell is the appliance which gives the most distinct call, but it requires either considerable battery power or a magneto machine to ring it.

The reed is independent of extra power, but its sound, received on the distant telephone, is comparatively feeble.

A telephone installation complete thus consists of three distinct and principal parts, *i.e.*, the telephone proper, the microphone with its battery, and the calling apparatus.

Its development in England was long delayed by the fact that the patent rights were all in the hands of one company, but, now that these rights have mostly expired, we may hope for rapid improvements and simplifications both in the instruments themselves and in the methods of using them. This view of the matter is of special importance to the growth of Army telegraphy, where simplicity for the soldier and economy for the exchequer are the two things needful.

The telephone, in its complete form with microphone and call apparatus, is a more or less delicate instrument, and requires an intimate acquaintance with its idiosyncrasies to keep it in good working order.

If we propose to extend the telephone for field service, and introduce it as an article for general use in the hands of the soldier, some simpler form is necessary; in fact, we may not hope to introduce any such apparatus which does not combine extreme simplicity with extreme cheapness.

Specimens of Instruments.

The following are some specimens of the instruments and appurtenances at present available in the military Service:—

1. A telephone in its original simple form.
2. The "Ader" telephone, transmitter, and receiver.
3. The "Ader" receiver combined with a vibrator.
4. The "Ader" receiver combined with a Morse key.
5. The "Berthon" transmitter.
6. The "Operators" telephone.
7. The "Gower-Bell" telephone.
8. The "The Siemens-Halske" telephone, with "reed" call.
9. The "Aubry" telephone (French Service).
10. A "trembling bell."
11. A "magneto call."
12. "Exchange" switch.

The "Ader" receiver, which is a modification of the telephone in its simplest form, can be used without a microphone, on short lines, as a speaking instrument, but is only of very moderate power when so used.

Its great value, however, appears when in combination with the instrument familiarly known as the "vibrating sounder," or "buzzer," a system, introduced some years ago by Major Cardew, which enables communication to be held under circumstances when every other form of telegraph would fail; by its means signals can be sent through bare wire lying on the ground, and even in water, while in India some successful experiments have, by its aid, been carried out in telegraphing without connecting wires across rivers.

The "buzzer" may be called the backbone of British field telegraphy. When a microphone is added, the combination can then be used at will for speaking, or for communication by Morse signals.

The "receiver" used in connection with a Morse key is, perhaps, the simplest form of all telegraphic apparatus; it was tried some years ago at Chatham, but difficulties were experienced in reading, on account of the make-and-break "clicks" being so similar in sound.

Late experiments at Aldershot have, however, shown that this difficulty is got over, and signals have been read with ease through a resistance of 4,000 ohms, and through field cable circuits, using only one field service battery cell, such as might be carried in a man's pouch.

The "Ader" apparatus complete, *i.e.*, telephone and microphone, is one of the best at present existing for speaking purposes. It has given excellent results during the last year at Aldershot for work between the various temporary camps, on the New Ash ranges, and on the "Exchange" systems during the manœuvres. It is not so portable as the "Operators" telephone, but speaks louder.

The "Berthon" microphone, or "transmitter," in which the carbon takes the shape of small pellets between two plates of the same substance, is of a very portable form, and is also useful for telephones in forts where the firing of heavy guns is apt to break the carbon pencils in the other pattern of microphones.

The "Operators" telephone is a combination of the "Berthon" microphone and the "Ader" receiver, these two being fixed to one handle.

The "Gower-Bell" telephone is, perhaps, the most powerful instrument of all; it is that used by the General Post Office, but its size prohibits its use as a field instrument.

The "Siemens-Halske" pattern has been a good deal used in foreign armies, and is at present in use with our balloon service, though it will, no doubt, be superseded by the "Operators" telephone.

The "Aubry" telephone, from our experiments at Aldershot, appears to give as good, if not better results than the "Ader" receiver. It is the pattern of receiver used in the French Army.

The principal method hitherto adopted of calling a distant station is the "bell" rung by battery power. This is inconvenient for military purposes in the field, owing to the size of the battery necessary, and the "magneto call" will be adopted for telephone stations.

Calls can also be effected by means of the vibrating sounder, or by the use of reeds, as in the "Siemens-Halske" instrument. The "reed" form of call, being the simplest, would seem to be that most suitable, if sufficiently audible, for the future development of telephones for outpost work, and where distances are short Morse signals can be transmitted by reed, as by key or "buzzer." Considering, however, the comparative feebleness of the calls, some contrivance for fixing the telephone against the ear might be found desirable.

“Exchange” Telephone Switch.

The switch used last year during the manœuvres was of the G.P.O. pattern, but the new form arranged by Major Bagnold is that sealed for use in the Service.

The Post Office pattern has the advantage of being more compact, and of being fitted for double wires; Major Bagnold's switch, that of dispensing with the connecting cords for the pegs.

To give a telephone fair play, double wires are often necessary, especially when vibrators are in the neighbourhood, or when the wires of the circuit run on the same poles as those of other circuits.

Under this consideration, I consider it very doubtful whether the G.P.O. pattern would not be the most serviceable in the field. No disadvantage has as yet been found in the use of the cords connecting the pegs, the absence of these being claimed as the chief advantage of the other forms.

Methods of Using the Telephone.

The telephone can be used in two ways for carrying on communication—

- (1.) As a talking instrument, with or without a microphone.
- (2.) As a receiver or transmitter of Morse signals.

Even the best telephones are not, as yet, perfect mediums for speech. The clearness with which words are reproduced depends to a great extent on the quality of the speaker's voice, if not also on the quality of the listener's ear. The softer or sibilant sounds are transmitted with difficulty, causing delays and errors in messages, and telephone circuits are peculiarly affected by disturbing influences, such as are produced by neighbouring telegraph circuits and earth currents.

Morse signals are transmitted with much greater certainty and accuracy by telephone than are spoken words, and I venture to predict that it is in this direction that one of the chief developments of the telephone for military purposes is to be looked for in the future.

The Morse signals can be produced in the following ways:—

- (1.) By the simple making and breaking of a current by a key.
- (2.) By series of vibratory currents sent by the key of a vibrating sounder.
- (3.) By series of sounds with Morse intervals, such as can be produced by reeds, whistles, or the voice.

All that is required is the general training of men to read Morse signals.

Comparison of the Telephone with Telegraph Instruments as a Means of Communication.

It might appear at first sight that, in matter of pace, a telephone used for speaking had great advantage over one used for Morse

signals, or over a telegraph instrument. But practically for written messages the pace is limited to the writing pace of the receiving clerk.

We know that forty words per minute is practically the utmost limit for first-class receiving on a sounder, hand-speed, circuit.

The Wheatstone fast-speed instrument used in the Post Office has certainly an output of 300 or 400 words per minute, but then it is fed at the sending end by a number of men, the individual work of whom, being taken into consideration, would not exceed forty words per minute per man employed. Forty words per minute is also the practical limit of pace in writing out a message, and thirty, or even twenty-five, would probably represent the average.

Now the human voice could send a message at the rate of from 150 to 200 words per minute, but although this might possibly be received on a good telephone, it could not be written down except by shorthand. We cannot, as yet, say how far the phonograph may help us for recording telephonic messages, but the phonograph could scarcely enter into consideration for universal use in the field.

Further than this, the telephone at present does not carry the voice so distinctly as to make it reliable for quick work.

From practical experience at Aldershot, when in some of the Divisional Offices both telegraph and telephone are working side by side, there is no doubt of the great superiority of the sounder over the telephone circuits for carrying traffic.

On the other hand, the telephone circuits require little or no special qualifications for the clerks employed, while, for the military sounder clerks, picked men and a training of from four to six or nine months are necessary even for 2nd class offices.

From the foregoing it appears that the following, if brought about, would be a way of increasing the carrying power of ordinary telegraph lines, perhaps up to five times:—

- (1.) Improved telephones.

- (2.) A more wide-spread instruction in shorthand writing.

The first we may look upon as a future certainty, the second as a matter of elementary education.

At the present time the instruction of shorthand is on the increase, and such are its uses that we may hope one day to see it taught in every school.

Pending these suggested improvements we must pin our faith on Morse signals for the more important work.

The reading of these is very easily attained by children and boys up to the age of eighteen, and, as the Service at present is not altogether without the latter, there would not seem to be any insuperable difficulty in obtaining a sufficient number of Morse clerks; and it is to be remembered that the telephone, as a Morse receiver, is a far more sensitive, economical, and simple apparatus than any telegraph instrument in use.

The telephone, as a speaking instrument, in its present state, rather more suited for conversation than for the transmission of im-

portant military orders; at any rate in the field. Its importance in this respect is most marked under circumstances where queries on minor details demand immediate replies, as is the case in local transactions with our supply services; and here comes in the advantage of a telephone exchange.

But for use on the main line of communication, or for outpost duty, except under exceptional circumstances, the effective use of the telephone for speaking is doubtful.

When and Where to Employ the Telephone (for speaking).

Having seen what telephonic appliances are available, what is to be expected and what is not to be expected from the telephone, attention may be next directed to the consideration of circumstances under which it can be profitably employed for Army purposes.

These may be generalized under the following headings:—

- (1.) Telephones and exchanges in garrisons.
- (2.) For coast defence, including artillery, submarine mining, and general purposes.
- (3.) On rifle ranges.
- (4.) On artillery ranges.
- (5.) For siege operations.
- (6.) Main lines of communication in the field.
- (7.) Intercommunication in camps.
- (8.) Outpost duties.

In Garrisons.

For garrison work the use of the telephone is obvious; it is employed at all our garrisons and dockyards at the present moment, and its great extension merely a matter of time.

For Coast Defence.

Having had no personal experience of the telephone for coast defence, I hope some of the Officers here will give us their views as to its present use, future development, and forms of apparatus most suitable.

On Rifle Ranges.

During the spring of 1891, telephone lines were erected along the three new rifle ranges at Ash, near Aldershot; the instruments used up to the present time are "Aders" (transmitters and receivers); these, as I learn from the Inspector of Musketry, Major Crabbe, have given such good results that the extension of the system to all ranges may be confidently looked for.

On each range the circuits run from the butts to various firing points, and each range is also in connection with the caretaker's hut and with the camp at Aldershot.

The movable instruments and batteries are fixed in a species of

sedan chair, which is carried from firing point to firing point as required.

For Siege Operations.

Colonel Lyons, the Commandant at Lydd, has made a series of valuable experiments with various forms of telephones for use in directing artillery fire at siege operations, and for observing and plotting results.

He has come to the conclusion that the telephone as a talking instrument is not reliable for this purpose, but that when in combination with the vibrating sounder it does excellent work. This, however, necessitates the employment of trained sounder clerks.

For Main Lines of Communication.

For work on main lines of communication the telephone, as a talking instrument, would not be of much service. In the first place, it would not carry the traffic which we are accustomed to, and, to give it fair play, it should be served by a well-insulated line, with double wires if on the same poles as other lines. These conditions are frequently impossible on long field lines.

At the same time, occasions would often arise when it might be desirable for Commanders in the field to hold direct communication by telephone, and arrangements for accomplishing this at will should always be made.

The Belgian system, introduced by Major Waffelaert, admits of a telephone and telegraph instrument being used simultaneously on the same circuit, without interfering with each other.

We have in the British Army an appliance known as a "separator" which accomplishes the same purpose, but it has not, as yet, come into general use, although it has a promising future before it.

As an example of what the telephone may be expected to do on a long field line, I may mention the experiments carried out during the summer exercise of the 1st division Telegraph Battalion last year.

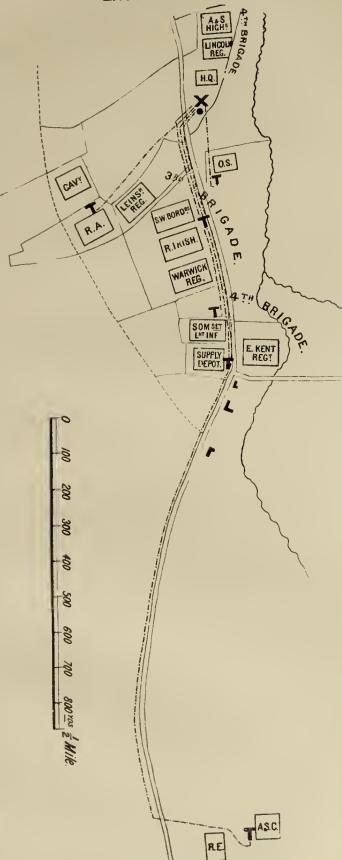
A field line 70 miles in length was run between Aldershot and Chatham, and on many occasions was used for telephone work. The line, running as it did through woods, and narrow lanes where contacts with trees and hedge-rows were unavoidable, was a very leaky one, but did not prevent the telephonic communication being carried on with fair success.

The instruments used were the "Ader" and the "Operators" telephone, and on the occasion of a ball which took place at Chatham animated conversation was kept up between the guests and some Officers at Aldershot. The "Ader" appeared to give the best results.

Intercommunication in Camps.

We are all familiar with the orderly and also with the fact that the orderly's duty is one of those that thin the ranks, so that any means

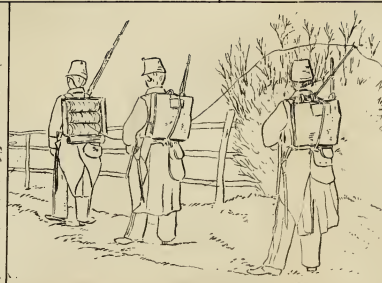
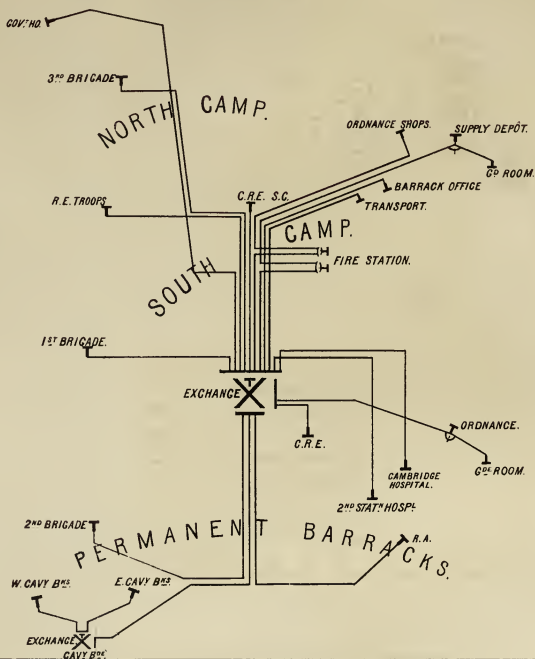
EAST MEON CAMP.



REFERENCE.

- TELEPHONE T
- EXCHANGE X
- TELEGRAPH OFFICE •
- TELEPHONE LINE - - - - -

TELEPHONE EXCHANGE SYSTEM AT ALDERSHOT.



REGIMENTAL OUTPOST TELEGRAPHS, BELGIUM.

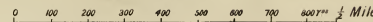
SOBERTON CAMP.

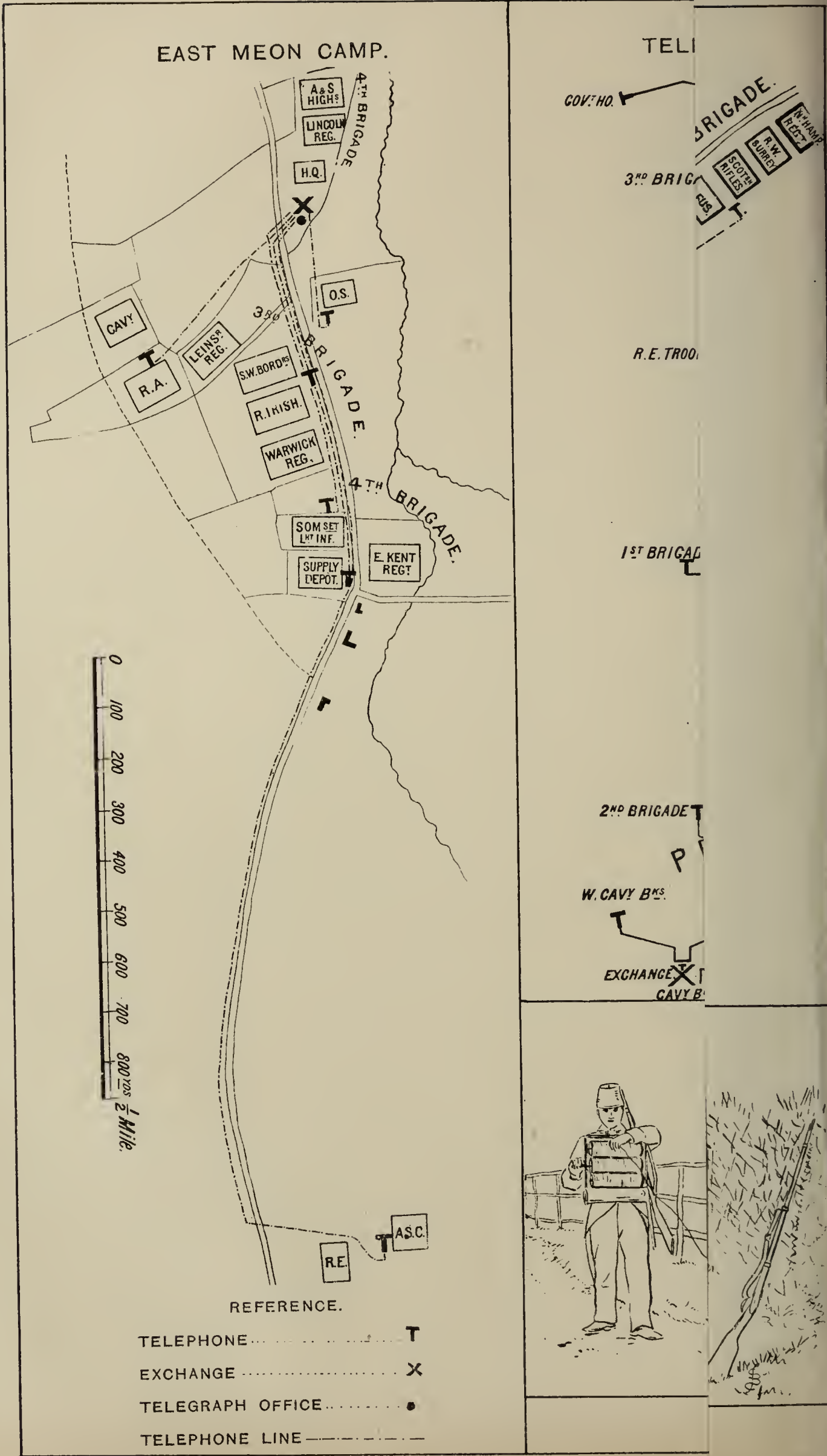


REFERENCE.

- TELEPHONE T
- EXCHANGE X
- TELEGRAPH OFFICE •
- TELEPHONE LINE - - - - -

SCALE.





which can be adopted for lightening his work cannot fail to be grateful to Commanding Officers.

The advantages of the telegraph or telephone over messenger, horse or foot, are so great and so well recognized as to render it unnecessary to repeat them here.

Telephone Exchange.

A telephone exchange gives us the power of putting any outlying office in direct communication with any other, so as to save the necessity of transmitting messages at a central station.

All commercial centres have long had their exchanges, and these are looked upon as indispensable for business transactions.

The first military exchange was established in Portsmouth garrison, over ten years ago. That at Aldershot was not established until within the last five or six years, but is now crowded with work. Plymouth followed suit some three years back, and the Curragh is meditating on the subject.

The naval dockyards have all, long since, had telephone exchanges.

The appliances of modern civilization are of slow growth in the British Army, but they come in the end.

During the summer manœuvres of last September, in Hampshire, exchanges were established in the camps of the two divisions, being the first instance, it is believed, of anything of the kind having been tried in the field.

The exchange switches were installed in separate tents close to the headquarter telegraph tent of each division, and the outlying offices were connected by air-line.

At East Meon these were six in number :—

- (1.) The Army Service Corps and R.E. camp.
- (2.) The supply depôt.
- (3.) The Somerset Light Infantry camp.
- (4.) The Warwickshire Regiment camp.
- (5.) The cavalry and artillery camp.
- (6.) The ordnance store.

The other regiments were so situated as not to require separate telephones.

At Soberton, the brigades being more concentrated, only three outlying stations were necessary, *i.e.* :—

- (1.) First Brigade camp.
- (2.) Second " "
- (3.) R.E., Army Service Corps, and Ordnance Store camps.

The exchange was in constant work during the manœuvres, and the results obtained may be judged of by the following extracts from opinions expressed by Commanding Officers.

A General Officer Commanding one Division reported as follows :—

"It was found to be of the very greatest convenience. The sending of the same amount of information by orderlies as was transacted

by telephone would have required the employment of ten times the number of men, and the saving in time was enormous."

A Brigadier wrote—

"There is no doubt that much time was saved by the use of the telephone."

And another—

"Undoubtedly the telephone exchange saved many orderlies."

While the following are among the opinions expressed by Officers commanding regiments:—

One reported—

"The saving of labour effected by it was the saving of distances to which it was necessary to send orderlies. . . . There would not appear to be any saving in the number of times orderlies were sent out, but, the work being lightened, fewer orderlies could be employed."

Another says—

"I found them of the greatest use, owing to the rapidity with which messages were conveyed, more especially at East Meon, where there was a telephone office in our camp. They were certainly of much use in saving orderlies fatigue, and prevented the wear and tear of their boots and damage to men's clothes, which would have resulted from the muddy state of the road. But, as regards the number of men used, I should doubt if there was any advantage gained in only a divisional camp, for the number of telephone orderlies and clerks employed of my battalion (four at Soberton, and six at East Meon) would have amply sufficed to do the orderly work which was saved by the telephone, only of course with much less despatch."

As regards the above, it would appear that the duty of providing clerks fell more heavily on this regiment than on others, as only one clerk was necessary at each telephone tent, and two at the exchange.

A third Commanding Officer writes—

"Much advantage was derived by the use of the telephone exchanges at East Meon and Soberton. I am of opinion that the service of one orderly was saved."

A fourth—

"Considers that one orderly was saved."

A fifth says—

"The telephone exchange was very useful, and undoubtedly saved orderlies."

And another—

"If there is telephone communication brought actually into the orderly-room tent, the telephone is a good deal used. If the telephone is outside the camp, it is used very much less. For instance, at East Meon the telephone was much used by the battalions, whereas at Soberton, where the telephone was only a couple of hundred yards away, it was hardly used at all."

Others say—

"The telephone exchanges at East Meon and Soberton were of great convenience, and a great saving to the number of orderlies whom it would have been otherwise necessary to employ."

“The orderly was saved much walking.”

And again—

“The distance traversed by orderlies was much reduced, but not the number of orderlies.”

One or two Commanding Officers had not occasion to use the exchange for local communication, but arrangements having been made by which telegraph messages for Aldershot, sent by telephone to the exchange, were accepted at the telegraph office, they express themselves very favourably on the system.

This consensus of opinion leaves little doubt of the efficacy of a telephone exchange for camp work, or of the probable demand there will be in the future, and, considering the simplicity of the apparatus needful, there would appear to be no great obstacle to its adoption universally.

The question reduces itself to that of the men available for the erection and maintenance of such exchange systems.

On home service, the telegraph battalion can often manage to provide them, but on active service, when the whole of the energies of this body would be devoted to the lines of communication, I fear that telephone exchanges might go to the wall.

It then remains to be considered whether the advantages to be gained would warrant the necessary equipment being carried and maintained by regiments.

Taking it for granted that the R.E. could provide the exchange switch, which would be erected alongside the telegraph office, the following equipment would be necessary for each regiment:—

- 1 Telephone complete, with microphone transmitter.
- 1 Magneto call.
- 1 Small battery.
- Half a mile of cable on a drum, weighing about 50 lbs.
- A few small stores.

Thus equipped, a regiment would, as soon as its camp was pitched, lay its own cable up to the exchange office, where it would be attached to the switch by the telegraph battalion.

The original outlay for such an equipment would be about 20*l.*, with an annual expenditure of, perhaps, 5*l.*, and even if this was doubled the total amount would bear favourable comparison with the cost of one soldier, while it would probably set free the services of several.

The carriage of the stores would be trifling; there would not be more than what two men could carry with ease, the cable being on drums similar to those in use by foreign armies.

Outpost Telegraphs.

Under the head of outpost telegraphs there may be also included all light telegraph work in advance of an army, whether in repair and utilization of the lines of the country, temporary lines for local purposes, lines in connection with reconnaissances, or arrangements for tapping the enemy's wires.

We know that during the American Civil War the telegraph went ahead of all troops, with or without escort, generally the latter. We also know that during the Franco-German War of 1870-71 the telegraph work was frequently pushed ahead beyond the cavalry screen, and specially escorted for the purpose; such is the necessity in warfare of at once gaining communication to the front. We also see Continental Powers equipping their cavalry with the telephone and telegraph, but it is to the former that the greatest attention is being given. It might now appear to us time to enquire whether we should not be moving in the same direction.

The instruments at present at our disposal have been briefly described, and endeavours made to give an idea of the extent of their powers, so as to open up a field for discussion as to how far a telephone, whether in its simplest form, or in combination with microphones, or telegraph instruments, might be made use of for outpost work.

We are not now uncertain of our field lines, as we were in years gone by, when our equipment was of inferior material. There is now a cable in our Service, weighing 70 lbs. per mile, that will stand a strain of 500 lbs., that I have frequently seen passed over by artillery and remain intact. In the vibrating sounder we possess an instrument which in combination with a telephone will transmit signals through bare wire laid on the ground, and even in water.

It rests then with those in command to say whether such means of communication as have been described would be useful on outpost duties.

Whether occasions would not arise when to be able to speak between main body, reserve, and picquets might not be of infinite value.

Whether the establishment of some detached post might not entirely depend on the facility of communicating with it.

Whether the fact of being able to communicate immediately with the chief points of an outpost line would not reduce the number of men necessary for outpost duty.

Whether the knowledge that communication was open throughout would not give confidence to the soldier.

And finally whether the mere fact of lines of cable, radiating from certain centres, would not be of great use, especially at night, as providing guides for reinforcements and the like.

Then as regards the cavalry: should they not be in a position to tap an enemy's line (which can be done with the telephone), or to complete and work a deserted circuit, when the local instruments would probably have been taken away? Or to run short lines for connecting their headquarters with certain points, or with the head of the advancing main line of communication?

These are mere suggestions; other occasions for use of the telephone will probably occur to many of you.

It is as a Morse receiver that I look for the best results from the telephone in this direction. But this would require trained clerks.

Any intelligent man, with a good ear, can in a few months be

taught to read sufficiently well for most practical purposes connected with military local work. Many become fair operators in six months.

Most regimental signallers who pass through the Signalling School at Aldershot acquire there a fair knowledge of reading by sound, and it would be to those to whom the charge of regimental telephones would naturally fall.

But there are three chief reasons militating against the introduction of a regimental system of outpost telegraphy in the British Army:—

- (1.) Expense,
- (2.) Taking the soldier from the ranks for the purpose, and
- (3.) If Morse signals are used, the difficulty of training men.

As regards the 1st, all that can be done is to simplify and cheapen the apparatus; and this is being accomplished year by year.

The 2nd reason might be met by the argument that adopting telephonic or telegraphic communication saves a number of men otherwise necessary for many duties.

The 3rd reason does not apply when the telephone is used only for talking, but, as it has been stated Morse signalling is perhaps the most effective for outpost work, this point must be considered, and is the most difficult to meet.

It is to be hoped that the cost of the telephone will be so reduced year by year, that before long a signalling instrument may be within everyone's reach, and become of common use in a barrack. One requiring no microphone, battery, or vibrator, but read by Morse. It would then be found that the art of reading the signals would spread of itself.

One good Morse clerk in a regiment could instruct many others during the year, without taking a man from other duties. Small prizes, as for musketry, would give the impulse.

It is from the hands of the signallers that we should expect the best results, and a regimental telephone equipment would double their power, giving them an alternative when signalling was out of the question.

The Telephone in Foreign Armies.

France.—The question of outpost telegraphs has been well to the front, for some years, in Continental armies.

France has taken the lead from the time that she saw what the telegraph effected in the war of 1866, and ever since that period she has striven to get the most out of the products of science.

Not only were telegraph sections created for the work on the lines of communications, but outpost telegraphs were from time to time experimented with, and organized in different branches of the service.

In each cavalry regiment there are six telegraphers, *i.e.*, two groups of three men each; and a light one-horse cart carrying four drums of cable in $\frac{1}{2}$ kilometre lengths, with the other equipment necessary.

Each cavalry division has a two-horse wagon carrying 30 kilometres of cable, batteries, and tools.

The telegraphers carry small batteries in their holsters, and telephones in their pouches.

What is known as "Trouvé's system" was introduced some years ago for dismounted outpost work, and consisted in a drum of double cable 1,000 kilometres in length carried on a man's back.

The instruments originally used were small watch-shaped sounders, and *a, b, c* instruments. These were soon superseded by Siemens' telephone, which about four years ago was itself superseded by the "Aubry" telephone.

Trouvé's system was first used during the siege of Paris.

Various methods of call have been tried with the telephone, mostly modifications of the reed, but the cavalry are now supplied with vibrators. There is still, however, a want of a more perfect means of ensuring attention being gained, and amongst other devices may be mentioned a form of head-dress by which telephones are strapped against the ears, and a microphone before the mouth. A pattern of this description invented by Colonel Roullez has, it is understood, been introduced into the artillery service.

Captain Zigang, a signalling Officer, has lately invented a call of the reed form which is said to give good results.

In 1879 and 1880 a great number of battalions of the 6th Army Corps were supplied with Siemens' telephones and 1,200 metres of cable each, but the experiments were not considered successful, and the advance of signalling at the time threw the subject temporarily into the shade.

The telegraph sections use Siemens' telephones, fitted with keys in the handle, for transmitting and receiving Morse signals, such signals being much more easily transmitted than the voice.

Berthon's pattern of telephone with magneto call has lately been introduced into the French service.

In his article on the French Armies, which appeared in the "Fortnightly Review" of November last, Sir Charles Dilke says, "The telephone was not, I heard, successful; the telegraph was very largely used."

This, it is to be supposed, entirely referred to the telephone as a "talking" instrument for outpost work, or on the lines of communication, and not for exchanges in camp, where there is no record of its having been used.

The following is an extract from an article by the special correspondent of the "Times," on the late French manoeuvres:—

"In addition to the balloon, the field telegraph and telephone were there to assist the leaders; 50 kilometres of cable are carried with the first line of troops. Each cavalry regiment can lay 2,200 yards of telephone line, and, with the cavalry brigade and division, 12,000 yards of telegraph.

"In the actions in Champagne, even the troops in the fighting line were linked with headquarters, and the independent cavalry divisions established a line as they advanced.

"The work was very rapidly executed, the trees which line the chaussées greatly facilitating the operation, and allowing the line to be raised as quickly as the troops could march."

Germany.—Germany has had for some years the Buchholz-Siemens system for outpost telegraphs. The detachment to work it consists of 1 non-commissioned officer and 2 men. They are provided with a knapsack, carrying 500 metres of double cable, and 2 Siemens' recorders. The rate for paying out is 1 mile in $16\frac{1}{2}$ minutes. In 1879 Germany had material for 60 double stations of outpost telegraphs.

A combined telephone and microphone similar to that introduced into our service has lately been adopted.

In sending a message by telephone in Germany, the words are sent in groups of three or four at a time, and repeated by the receiving clerk; any difficult word, such as "Leszczynski," is spelt out in numerals, which are more easily transmitted by telephone than letters, a table of numerals to correspond with the letters of the alphabet being constructed.

There is a strong prejudice in Germany against the use of the telephone, on account of its not recording the messages.

Belgium.—In Belgium Major Waffelaert, the Officer Commanding the Telegraph Corps, is a strong advocate of telegraphs for outpost work, and has devoted much time and thought to this subject. The system he has adopted for the Army telegraphs is that known as "Rysselberghe's," whereby it is possible to use, at will, the telephone and telegraph instrument, simultaneously or otherwise, on the same circuit. One of his chief reasons for this system is that it is employed on the State telegraphs in Belgium, and Major Waffelaert considers the advantage of the military telegraphs being able to work in connection with those of the country.

In addition to the Telegraph Corps, there is in Belgium a system of regimental telegraphs that has an equipment of the lightest possible description.

The cable has a core of four phosphor bronze wires, and only weighs 13 lbs. per mile.

Its breaking strain is about 80 lbs. One man carries 1,200 metres of this cable on three drums, arranged in a frame of exactly the same dimensions as his ordinary knapsack, the load being about 24 lbs.

The instruments, comprising telephone, microphone, battery, induction coil, and call, are carried in the cartridge cases of the infantry, and in the holsters of the cavalry.

Vibrators and reeds are used as "calls," and the telephones can be held against the ear by elastic bands.

By adding a small condenser the apparatus can be fitted up, as in the "Rysselberghe" system, the vibrator being used for Morse signals.

Major Waffelaert considers that Morse signals are not adapted for outpost work, on account of the difficulty of obtaining trained clerks, a matter discussed in another place in this paper.

Italy.—Italy has been disposed to use telephones for military work

more than any other country. She was the first to make use of the vibrating armature for giving signals, and also makes use of the Morse key, in combination with the telephone.

Spain.—In Spain, owing to the mountainous character of the country, the whole telegraph equipment is of the lightest description, and carried on pack animals. Since 1859, the organization for using telegraphs for tactical purposes has been contemplated.

Mounted outpost telegraph detachments were formed in 1868, but, on account of the number of mounted men required to carry the equipment, these were discontinued.

For outpost work, the original instrument was the "Trouvé" sounder, but this has since been replaced by the telephone and Morse key combined, as in Italy.

In Spain the outpost telegraph is pushed right up to the outpost line of picquets, and, it is said, with good result.

Russia.—Some eight or nine years ago an outpost instrument ("Horschelmann's") was introduced into the Russian cavalry; it was similar to the "Buchholz" of Germany, and carried on the saddle.

This was tried by the Uhlan Regiment of the Guard, and, from the results obtained, introduced into all the cavalry regiments. Whether it has been superseded by the telephone I am unable to say.

Austria.—Cavalry telegraphs were organized last year, for the purpose of connecting cavalry divisions with the nearest telegraph stations, and enabling them to make immediate use of the telegraph lines of the country. The telephone, no doubt, will be largely used for the purpose.

Conclusion.

A statement of what might be expected from the telephone in its present development having been laid before you, and suggestions made as to its employment, it only remains to touch on certain drawbacks attending the use, or rather the improper use, of both telephone and telegraph; classing the two together under one head.

In a recent article published in the Proceedings of this Institution it was stated that "the employment of this technical auxiliary in the first line restricts the high mobility of present warfare." It is possible, and even probable, that the telephone will often create unnecessary correspondence.

The ease with which communications can be held will offer temptation to the more feeble to seek the shelter of non-responsibility, to the wavering increased facilities for vacillation, and to some others improved openings for making their presence (in the spirit) felt when least desirable. All this, I have no doubt, the writer had in his mind—in fact he saw centralization encouraged by the telephone.

But there is another side to the picture. In a very remarkable article published by this Institution, in 1887, and entitled the "March and the Battle," the following gives the key-note:—

"The little influence thus possessed by the Commander-in-Chief, in choosing the occasion for decisive action, is really an element of great difficulty in the warfare of the present day."

The whole of the article appears to me a most forcible argument, unintentionally, but unmistakably, showing the necessity for a wide extension of the telegraph. The urgent demand for that unity of action almost, if not altogether, lost under the conditions of modern war: "a great united effort instead of a number of isolated blows."

I would ask whether the telegraph restricted the mobility in the American Civil War; or, again, whether it did so in the Franco-German War. The history of the telegraph (and it is written for both) is a series of brilliant records of its achievements. "Technical art is striving hard to discover fresh means for enlarging the influence of those in supreme command," and the telephone is its latest effort.

The CHAIRMAN: I have no doubt that there are among you some Officers of the Royal Artillery, both garrison and field—superior Officers, who are able to speak upon the advantages of the facility of concentrating fire by means of the electric telegraph, either by the telephone used as a sounder, by the Morse telegraph, or by the sound of the voice, and I dare say there are Engineer Officers here who will be able to speak of the value of telegraphy for siege purposes. Doubtless there are also here Officers of the infantry who will be able to give us their valuable opinions as to how far the telegraph or the telephone can be used and trusted as an instrument in time of war, whether at the front or how far to the front. The discussion is now open, and we shall be very glad to hear what Officers may have to say.

Colonel KEYSER (Inspector of Signalling, Aldershot): General Feilding and gentlemen, I am very sorry that I should be the first to throw myself into the breach of discussion, but as Major Beresford and I have now for many years worked, I may say, side by side, and I hope always in harmony, I think it would be as well if I commenced by pointing out that in many particulars I agree with him entirely as to the signallers of the Army being able to carry out all that he has proposed in his lecture. I am perfectly certain that with perhaps less than a fortnight's instruction any signaller in the cavalry or infantry could easily manipulate a Morse sounder. It would not only be an advantage for them to be able to do so, but it ought to be a necessity; no infantry or cavalry signaller's education should be complete until they have gone through a modified course of telegraphy. I pointed out in a lecture a short time ago, at Aldershot, that in my opinion every cavalry signaller should be taught the rudiments of telegraphy, how to tackle wire, the nature of a battery, the reason why batteries act, the way to repair wires, the way to repair batteries, and any small details of that sort, and I am sure, such is the intelligence of the modern signaller, that in a very short time he would be taught to do this. We are quite pleased that the Royal Engineers should be the brains of the Army as far as telegraphy goes, but I think that the signallers ought to be the arms and legs, and I am perfectly certain, in a very short time it will come to this, that on service the whole practical work of sending and receiving will be done by the signallers; in fact, my opinion is that there ought to be one central school—I do not care who is at the head of it, whether an infantry man, a cavalry man, or a Royal Engineer—there ought to be one central school of telegraphy, where every means of conveying intelligence, including visual signalling, which is really almost part, you may say, of telegraphy, should be taught by the various professors, and these school men once turned out, ought to be permanent signallers, and enlisted as such. At the present time you take a well-educated man and make him a signaller: what is the result? I have taken the trouble to find out how long a man remains a signaller, and on the average I find he is only with his regiment for three years. After that he either goes to the Reserve, or finding that he is possessed of some intelligence which has never been brought out before, and which he did not know he possessed, he plucks up spirit, takes a stripe, and becomes a non-commissioned officer, and is lost to signalling. If signalling were more recognized, and treated as

a whole, telegraphy, telephoning, and signalling, this sort of thing would be altered, and a signaller would be a signaller and nothing else. There are very few required, and I am sure the advantages gained would more than compensate the loss of a few men per regiment. The lecturer talked about the feelings of Officers as to orderlies, that orderlies were not so much wanted at manœuvres, and most of them say that the use of the telephone did away with one orderly. The real reason why orderlies are still so much a necessity is that Commanding Officers are afraid of the telephone. They get an order through the telephone; they are not quite certain whether it is an order. They act upon it as a rule, but until an order becomes a written message they are not happy. That will always be so until a rule is made that every message through the telephone must have been written and signed, so that in the evening all these messages are collected and checked at the receiving place. Then they will know that they can rely upon a telephone message; but if a Commanding Officer thinks that anybody who likes can go and shout a message to him through a telephone, he does not know where he is, and he is rather afraid to act upon it. I am sure the lecture we have had is most instructive and interesting, and I am very sorry there are so few here comparatively to have heard it. The whole of the British Army ought to have been here.

Major WAFFELAERT, Belgian Army (translation) : Gentlemen, I beg you to excuse me if I speak in French, as I have not sufficient practice to enable me to speak English correctly. If I speak at all, it is in order to draw the attention of the meeting to one point. It seems that an outpost apparatus should be simple, strong, and small. It must be simple, so as not to be liable to get out of order; strong, so that it may be placed in the hands of soldiers unskilled in the handling of delicate apparatus, and often handling them roughly; lastly, it should be small, in order to facilitate transport. For these reasons a good magnetic telephone, which can be also used as transmitter, would be the best apparatus for outposts, but for certain drawbacks which Major Beresford has pointed out. Now it appears from our experiments that the greater part of these drawbacks disappears when the soldier with the telephone can hold an instrument to each ear. In this case the soldier, even though little used to telephoning, understands the person talking much more easily, even when the latter speaks indistinctly. It is thus a question of a head fixing. We have found that an ordinary elastic band fixed to the telephone and passing obliquely round the head is a good fixing. Each year we erect lines at the camp of Beverloo for observing artillery practice, and the Siemens' telephone used as transmitter has always given excellent results. The same is true of the Dehorowicz telephone, which is not larger than the Ader. I greatly admire Captain Cardew's vibrating sounder when the lines can be operated by specialists.

Major G. W. ADDISON, R.E. : Perhaps, as I am not altogether in accord with my friend Major Beresford in his proposals, I may, by speaking now, do something to promote discussion. Major Beresford has said very little in his lecture about the chief use which we make of the telephone in time of peace. I mean as regards the telephone systems in garrisons and fortresses. That is a large question, and I am afraid the time allowed to me would not admit of my dealing satisfactorily with it, and, therefore, I will pass on to those details which he has gone into in connection with telegraphs and telephones in the field. The first is "field telephone exchanges." Major Beresford recommends that each infantry regiment should be provided with a telephone equipment, so that as soon as it comes into camp it would be able to lay a cable up to the exchange office and attach on to the exchange switch. I do not know how he reconciles that with what he says in the introductory paragraphs of the lecture, viz., "The telephone, in its complete form with microphone and call apparatus, is a more or less delicate instrument, and requires an intimate acquaintance with its idiosyncrasies to keep it in good working order." It is true he goes on to say he hopes the telephone will be very much simplified, and I have no doubt it will; but personally I cannot say that I think you will be able to trust to any soldier without technical training—I do not care what branch of the Service he belongs to—to walk up and connect you with a field telephone exchange in this way. By the time we reach that stage, I think we may also hope to have got the army of shorthand writers which Major Beresford appears to desire. Then as to "cavalry telegraphs," which I prefer to separate from outpost telegraphs

proper. Major Beresford has given us a very interesting account of what foreign nations have done and are doing in this direction, and especially as regards the French equipment. The French, undoubtedly, up to a certain point, have got their telegraphic arrangements for a campaign more perfect than any other nation. In their organization they attach six telegraphers to each cavalry regiment; but Major Beresford has not mentioned what I think is the most important point of all, and that is, that these telegraphists are not men trained, as Colonel Keyser would wish to try to train them, in military schools; they are first class telegraphists. The French consider that for work at the front they need better telegraphists than anywhere else. The cavalry telegraphists are either men who having been trained in the Post Office, are serving in the Army (cavalry), or men who, after being cavalry soldiers, are employed in the Post Office during their Army Reserve service. The great object of having cavalry telegraphists in the French Army seems to be to utilize the existing telegraphs of the country, and they naturally do not care about the telephone for this purpose, but they are prepared to use it where they can. As regards "tapping" messages sent by the enemy, the French express some doubt whether that can be done very much; because they use on the Continent, to a considerable extent, a form of apparatus—the Hughes—which cannot be "tapped." It is quite certain that it is no easy matter to "tap" a telegraph line when messages are sent at fast speed and in a foreign language, and you are not going to do this by regimental signallers, however well trained. I confess I do not much care about a *regimental* telegraph or telephone equipment for cavalry. I think it is the one thing above all others which is likely to lead to that feeling, alluded to by Major Beresford, of telegraphs proving a check upon the initiative of Officers in the field. Take the case of a cavalry regiment at the front, with its telephone or telegraph connected up to headquarters. An energetic Colonel may, probably, send back many messages on scanty information, and the General will soon look upon them all as valueless if not mischievous! On the other hand, the Colonel may find a Staff Officer at headquarters moving him about and ordering him in every direction, I think you had better attach a certain number of telegraphists to a cavalry division, and let the Officer commanding the division have an equipment which would enable him either to keep in communication with headquarters, or to maintain communication with any particular regiment detached for special service. In any case I would wish to say again that the telegraphists must be the very best you can get. Then I come to outpost telegraphy proper. There is often a great deal of confusion on this subject, because, as Major Beresford points out, all telegraph work in advance of an Army may be called outpost telegraphy. In the French organization the sections of the first line are only supposed to keep up communication between one Army Corps and another, and between Army Corps and the Army Headquarters in the rear; these sections do not provide any communications with "divisions" which are considered special duties to be provided for somehow by the General Officer Commanding the Army Corps. With us the division is a much more important part of the field army than it is in the huge armies of the Continent, and our telegraph battalion undertakes, as part of its work, to keep the headquarters of an Army Corps in touch with its divisions. Therefore when we talk of outpost telegraphy we mean what Major Beresford refers to in the lecture, that is to say, to electrical communications with the piquets and sentries in front of an Army at rest. If you have outposts out in foggy weather, &c., there cannot be a doubt that some electrical system of communication would be a great advantage. It would enable the army to rest more quietly and comfortably if they knew that they were certain to get early warning of an attack. Whether you had better use the telephone or the telegraph for such a purpose is still an open question. Major Beresford admits, in most of the extracts he has given in his lecture, that foreign countries are not much in favour of the telephone. Personally I think you must have a trained staff to look after the telephone (if it goes wrong an untrained man won't know what to do with it), and if you are to have trained men they may as well be telegraphists, and then it is perfectly immaterial what form of instrument you adopt; they will be able to use whatever is the best suited to the circumstances. My moral then is a simple one: if you think this advanced tele-

graphy in any form—I do not care whether cavalry or outpost—is really worth having, you must make it as perfect as possible, and you must be prepared to pay the cost of adding, if necessary, to your telegraph battalion.¹

Major BERESFORD: General Feilding and gentlemen, I quite sympathize with the remarks Colonel Keyser made about the difficulty of getting men from regiments for training as signallers. I have experienced the same difficulty myself in obtaining men from the various regiments at Aldershot for training as telegraphists. As long as the Officers Commanding regiments have nothing whatever to do with telegraphs themselves, and have no interest in them, they will not give it the men if they can help it. If it was to their own interest to produce telegraphers, and if they had a regimental equipment at their disposal, they would produce them fast enough, and, no doubt, undertake that they should become good telegraphers. With regard to written messages, at Aldershot all telephone messages are written out just in the same way as telegraph messages. At the telegraph exchange, on manœuvres, the messages were written out or not as the senders thought fit. The necessary forms were at their disposal. Colonel Keyser thinks the whole of the British Army ought to have been here. I only hope the whole of the British Army will consider whether they could not build a better theatre than this to hold them if they did come. I have to thank Major Waffelaert very warmly for taking part in this discussion. Major Addison questions the ability of the British Line soldiers to gain an intimate acquaintance with the telephone. I do not question that at all. I know the Line regiments have many men of considerable ability, men of all kinds of trades, mechanics and others, and I venture to say that in every regiment of the British Army there are several, half a dozen or more, who, with a week's training, would be perfectly competent to undertake the charge of telephones such as are used on exchanges.² I will just state what I once saw with regard to the Fire Brigade telegraph system in London. I was going round a station with Captain Shaw, and I there saw delicate ABC instruments (and there are no instruments more delicate) in the men's rooms. I asked him if he left them there to be knocked about and tampered with? He said he left them there on purpose, because he found, by so doing, that the men took an interest in them; they came to know them, and kept them in order, and he had no trouble whatever in the matter. On the subject of the French telegraphs I had a good deal more to say, but time did not admit of it. I did not, therefore, enter into the question very closely. The original French cavalry telegraph service was practically organized by the Decree of 1884. There is another Decree of 1889, which has considerably altered the first organization, and made the personnel far more telegraphers than cavalry soldiers; in fact, they do little or no duty as cavalry soldiers now. There is a cavalry telegraph school, under the command of a Captain of cavalry, who only looks after discipline, but does not interfere with training. The latter is under a functionary of the military telegraph department. While with the Army the men are employed thirty-six hours a month in the Government telegraph offices, so that they become fair telegraphers. I hear from an Officer present at the last French manœuvres that in every direction he saw the telegraph and telephone at work with the cavalry and artillery.³

¹ My remarks were in no way intended to discourage the training of visual signallers as telegraph operators, but experience has conclusively shown that the limit is soon reached to which such instruction can profitably be given. The problems of outpost telegraphy are not, in my opinion, to be solved by this means.—G. W. A.

² But for outpost work, when the telephones would be necessarily placed in many different hands, the simplest form of instrument suited to all would be required.

³ List of additional apparatus exhibited, not previously mentioned in the paper, and kindly lent for the purpose by the undermentioned:—

By Messrs. Siemens Brothers—

Hellesen's dry-cell battery.

Knapsack, with cable, for outpost work.

Samples of cable, &c.

The CHAIRMAN (General Feilding): Gentlemen, it is a subject of great regret to me, and I think it must be to most of you, that there have been no Officers of the Royal Artillery or the cavalry who have taken part in the discussion. They might have a great deal to say on this all-important subject, as showing how, in these days of large armies and vast assemblages of guns, it enables us to get all the advantages resulting from concentration of fire without having to send mounted orderlies and *aides-de-camp* to create that concentration at a given moment. We should like also to have heard some cavalry Officers speak upon this subject. In the Franco-German War, of which I had the honour of seeing a good deal, the Germans constantly did tap the French lines to my knowledge, and to my own detriment on one occasion, and they quietly spoke in French along these wires, and used the French codes, which they had got hold of, and caused considerable confusion at headquarters more than once. I think telegraphists ought, where it is possible, to use the telephone, because it is not easy for a man to imitate the voice of another person, especially if he does not know whose voice it is he is to imitate. If you expect to hear a certain man speak and you hear somebody else your suspicions are at once aroused. I do hope, as Colonel Keyser says, more encouragement will be given to our infantry soldiers to learn the telephone and telegraph, and to get fully acquainted with all the apparatus connected with it. It will be of great use to them in civil life when they go to the Reserve, and afterwards when they pass into civil life permanently. The difficulty that we have in finding permanent employment in civil life for our infantry soldiers is that, unlike the cavalry, artillery and engineers, and other departmental corps, they have, generally speaking, not learnt any particular profession, and if they did belong for a short time as boys to any particular profession beforehand they have had time to forget it, and they generally have managed to forget it thoroughly. Major Addison spoke, it seemed to me, with a considerable amount of sense as to whether the telegraphic equipment should be regimental, brigade, division, or corps. My own experience in the Franco-German War was that it was then under Post Office officials. There it was a corps organization altogether, formed of civilians, who wore a sort of military uniform. On more than one occasion it was pushed forward to the outposts, and with very satisfactory results after the taking of Orléans the first time. On one occasion, the 2nd of December, when the line of battle extended over 30 miles of ground, and where it was necessary to have rapid communication with headquarters, it was of very great importance to be able to connect with headquarters the outposts at the extreme flanks of an enemy so extended in front. Our friends on the Continent, as you all know, have begun to train dogs for the purpose of communicating with outposts. I am not aware that our own Army have embarked upon that experiment. Dogs are said to be extremely useful in this capacity; but I think it is open to doubt whether they are so absolutely reliable as such a means of communication should be for such very important purposes. Dogs may be shot, they may be entrapped; many things may be done to divert them from their proper course. Telegraphy is a little more difficult to divert in that way, and therefore more dependable. I sincerely hope that one of the results of this very interesting lecture which we have heard from our esteemed friend Major Beresford may be that the military authorities will take even more interest than they do at present in the

By the G.P.O.—

D'Arsonval's telephone.

The original telephone brought into England by Mr. Preece.

The new Gower-Bell.

The operator's receiver for fitting to the ears, &c.

By the Consolidated Telephone Company—

The Divers' telephonic apparatus.

The domestic switch board.

The Fitzgerald telephone.

The portable Gower-Bell.

The Bell-Blake magneto-combination

Form of operator's receiver, &c.

development of this most important branch of the Service. We are, I think, always a little behindhand in England in adopting inventions. I recollect in America in 1877 there was a speaking telephone between Boston and New York. It was a long time after that before it became of commercial use here. In England, however, when we do take a thing up, though it does take a long time to adopt a new invention, we generally manage to make it very perfect and make it very practically useful. I do hope that by this discussion we have had to-day, and other discussions which I hope will arise out of it at some future lecture, we may benefit not only ourselves but the Service generally. I venture to take it for granted that you will all agree with me in passing an unanimous vote of thanks to Major Beresford for the extremely interesting lecture he has given us, and for the pains that he has taken to get these valuable collections of electrical instruments together, and to explain them to us. I am glad also that you have been able to welcome our distinguished military friend, Major Waffelaert, of the Belgian Service, who has done a great deal of useful work in the perfection of a military system of telegraphy in that important country.

Friday, February 26, 1892.

GENERAL SIR C. P. BEAUCHAMP WALKER, K.C.B., Vice-President, in the Chair.

THE RECONNAISSANCE OF A RAILWAY: ITS UTILIZATION AND DESTRUCTION IN TIME OF WAR.

By Colonel J. S. ROTHWELL, R.A., p.s.c., Professor of Military Administration, Staff College.

Introduction.

THE reconnaissance of a road is a military problem with which, in these days, most of us are sufficiently well acquainted, but it is rare in this country to find any Officer who has had experience in executing a reconnaissance of a railway. This is not due to any failure on our part to recognize the importance of railways in war, but it is to be attributed to that fact which makes itself felt so constantly in all our military arrangements, viz., that we are not a Continental Power.

If our railways were continuous with those of one or more foreign States, the question of the reconnaissance of railways on both sides of the frontier would assume a prominence far beyond the position which it occupies at present; but, so long as these islands can only be reached by ship, a detailed reconnaissance of most of our home railways would have but little military value, while time spent on examining our neighbours' lines in view of possible contingencies would be absolutely wasted. It is said that before the outbreak of the war of 1870 German Officers had ascertained the exact dimensions of every bridge on the French lines leading to Paris, and that, when in the course of the operations it was reported that a certain bridge had been destroyed, girders of the proper size for its repair could be at once forwarded from Germany or elsewhere. Nothing of this sort is necessary for us. We have no intention of invading the territories of our Continental neighbours, and the prospect of an invasion of our own islands excites no apprehension, and awakens but little interest.

There are, in fact, only two regions in the world where railway trains can run from British territory direct on to the lines of a foreign State, and *vice versâ*; these being in North America and in South Africa.

In North America the lines of the Dominion of Canada connect at various points with the railway system of the United States, while in South Africa the railways of the Cape Colony and of Natal are already in touch with those of the Orange Free State, and in the near future

will probably be joined to such lines as the Government of the Transvaal Republic may see fit to construct.

There is, however, in the more remote future, a prospect of a railway connection being accomplished which, if it ever takes place, will have a greater military interest than those junctions in America and in Africa, and that is the union of the Russian Asiatic system with our Indian network. Roughly speaking, these railways at their nearest points are less than 600 miles apart as the crow flies (just the distance from Land's End to John o' Groat's House), representing, perhaps, 800 miles to be constructed in order to unite them; and, if this gap should be bridged over, there will be some interesting problems in railway reconnaissance to be worked out by those who may then be responsible for such matters.

It may appear to some persons that, so far as regards railways within our own territories, a special military reconnaissance is unnecessary, inasmuch as the fullest particulars as to their construction and working can be obtained from the officials of the company. The difficulty, however, is that while in some respects these particulars will be very full, and possibly too full, other information, especially if of purely military importance, cannot be obtained from the same source, and it will therefore generally be desirable to assign to a military Officer the duty of collecting the required information.

The Reconnaissance of a Railway.

Our first business to-day is to consider what would be required of an Officer charged with the carrying out of such a reconnaissance; that is to say, how he should observe, and what he should note.

To begin with, it may be at once laid down that an Officer travelling as an ordinary passenger in a railway carriage is not in a position to observe the military features of a railway, even though he may perform the journey many times. A special train is not likely to be at his disposal, and in any case it is not so convenient as the ordinary platelayers' trolley with a few men to push it. Seated on this a good view is obtained in all directions, and when any points have to be specially examined, there is no difficulty about leaving the vehicle, which is only a foot or two above the rails. There is also this advantage in reconnoitring from a trolley, that when the line is not in actual use—as in the case of a railway abandoned by the enemy—the passage of the vehicle along the line is a proof that the gauge is true, and affords to some extent a guarantee that no concealed mines have been laid.

In many cases, however, the reconnaissance must be carried out on foot, and as this may be done while trains are running on the line, it will perhaps not be superfluous to give a word of caution as to walking along a railway.

Accidents are generally caused either by a train coming up unperceived from behind, as may happen when there is a high wind, for instance; or else when a person who is walking in the six-foot way steps back into the down line to avoid the blast of a train travelling

on the up line, and is then struck by a down train passing at the same moment. The rule of never walking between the metals—especially on a single line—should therefore be most carefully observed, but, if it cannot be avoided, it is best to choose that line of way on which trains will be met, approaching from the front; that is to say, on an ordinary double line, the right-hand road.

The next thing to be considered is, what ought to be noted when making a reconnaissance of a railway, and this may be grouped under three main heads, viz. :—

The Permanent Way.
Stations and Signals.
Rolling Stock.

The permanent way, as is well known, is the term applied to the railway in its finished condition, as contrasted with the temporary lines used while the work of construction was still in progress. It may be single or double, and, in a few cases, even triple or quadruple, but if it is only single, as is usually the case abroad on all except main lines, it is of importance to ascertain whether bridges, tunnels, and earthworks have been made wide enough to allow a second line to be laid. This width depends to a considerable extent upon the gauge, but does not depend on this exclusively, as, in order to obtain increased accommodation, it is usual on lines with less than the normal gauge to make the superstructure of the carriages nearly as wide as it is on lines of the wider gauge, and thus what is termed the “over-hang” of the carriages, and which determines the width of bridges, tunnels, &c., may be abnormally great.

The gauge of a railway, being a matter of the first importance, should always be noted in a reconnaissance of the line. In this country we are so much accustomed to the uniform gauge which has been adopted on all lines except part of the Great Western system that we might be disposed to fancy that a similar uniformity is to be found elsewhere; but this is not the case, for in Brazil seven different gauges are in use, and in the United States eight, while many other countries have a broad gauge for their trunk lines and a narrow gauge for the branch lines. An Officer making a reconnaissance of a railway out of England should therefore never take the gauge for granted, but should always measure it, and for this and other purposes it may be mentioned that a walking stick, marked off by small notches into feet and inches, will be found a very useful companion when making such a reconnaissance.

The normal gauge which has just been referred to, and which is in use in England and throughout the Continent of Europe, with the exception of Russia, Spain, and Portugal, is, as is well known, 4 feet 8½ inches. There is no special virtue or symmetry about such a width between the rails to account for its selection, and the explanation of the fact that the great majority of lines in the world are thus laid is to be found in the history of the first railway worked by a locomotive, in whose wake the rest have followed. When this line between Stockton and Darlington was built, it was made to take engines of the same size as

George Stephenson, its engineer, had previously used successfully on the Killingworth tramway, and the gauge of this had been determined by the track of the ordinary coal wagons of the country drawn by horses, to suit which a wooden, and afterwards an iron, tramway had been originally laid down.

The modern railway can thus, by a process of evolution, trace its descent from the wagon ways of the north of England, and the distance between the wheels of the rude trucks there used has been transmitted unchanged to the elaborate vehicles now running over the greater part of the civilized world.

The next point to be noted with respect to the permanent way is the mode in which it is laid, whether on transverse or longitudinal sleepers, and how the rails are secured to the sleepers. If chairs are used, as is the case on most of our English railways, with the double-headed or bull-headed rails, it is necessary to observe the form of the chairs, and the manner in which they are bolted to the sleepers.

Proceeding along the line, the reconnoitring Officer would note the gradients with the distance over which each extends, and it may not be undesirable to mention that the report should never omit to state in which direction the line rises or falls, as the simple statement that at a particular place a gradient of 1 in 250 occurs conveys no definite meaning unless it is supplemented by the words "rising towards X," or "falling towards Y." The special object aimed at in recording the gradients on the line is to ascertain the maximum or, as it is generally termed, the "ruling" gradient, on which the proper working of the traffic largely depends, as it is this gradient which determines the locomotive force necessary. In the case of our own lines, such particulars might be obtained at the offices of the railway company, but it is hardly likely that information of this nature will be accessible under all circumstances without direct observation. This, however, is easily obtained, as on every line the gradients are clearly marked for the benefit of the engine drivers, and the correct figures can be written down in a reconnaissance report.

The dimensions, material, and construction of all culverts, bridges, and viaducts would naturally be noted, and in the case of tunnels the report should mention whether they are cased with brickwork throughout, and should also indicate the nature of the rock or soil through which the tunnel has been pierced. The height of embankments and the depth of cuttings must also be observed, and the nature of the strata through which the latter have been cut, and it is also important to note whether their sides are revetted, and at what angles they stand.

Stations and Signals.

Stations may be either "terminal" or "road-side," and are further classed as *passenger* stations and *goods* stations; the ordinary country station on a through line being, for instance, correctly described as a "road-side passenger and goods station." To enable a just opinion to be formed of the value of a station for military purposes, one of

the first things to be done is to make a ground plan of it. The most convenient scale for such a plan has been found to be $\frac{1}{2160}$, or sixty yards to one inch, and in order to avoid a multiplicity of lines it is usual to represent each "road" or pair of rails by a single thick line. In order to obtain additional clearness, especially where the station is a large one, the lines may be represented at wider intervals apart than they actually are, but if the lateral distances are thus exaggerated, the fact should be distinctly stated on the plan, as it may otherwise give a very erroneous impression of the actual amount of space available. The plan of a railway station for a military reconnaissance need not be drawn with minute accuracy, but it must show the essential points correctly. These include the way in which the different sidings connect with the main lines, the correct positions of points and cross-over roads, and the length and position of platforms and sidings.

Military trains being, as a rule, longer than the passenger or goods trains which ordinarily run on English lines, it will usually be a matter of great consequence to know whether a given siding will hold a given military train; as, if the siding is too short, and the train has to be divided, much delay and inconvenience will be the result. In the same way, on a single line, it is important to know whether the portions of double line, or passing places, are long enough for a military train, and this is not always apparent from a plan. The information which is actually wanted is the length of train which can stand in a siding, or at a passing place, without interfering with the traffic on the adjoining line of rails; and if this is obtained by measuring on the plan the length of the siding from the point where it is shown as diverging from the main line, it will generally be found that the length so arrived at is some fifty yards longer than it is in reality. It is, therefore, necessary to note on the plan the "available length" of each siding, this length being measured from the point where the siding has diverged so far from its neighbour as to be perfectly safe from all risk of collision. As to clear the overhang of ordinary English railway carriages 2 feet 3 inches must be allowed on each side, it follows that no part of a siding is available where there is an adjoining line used for traffic at a less distance than 4 feet 6 inches.

In reporting on a railway station, it is also necessary to mention any turntables, cranes, or other appliances which might be useful, and to give a description of the buildings, and of the manner in which they are lighted. The number of railway officials usually employed ought to be noted, as well as the coal and water supply available, the means of watering engines being, of course, especially important, and the source from which the water cranes or stand-pipes are supplied.

The exact dimensions of all existing platforms should be given, the height being always taken from the rail level, and not from the ground, and any spare material, such as rails or sleepers, which might be utilized for the construction of additional platforms, should also be specified, and its position marked on the plan.

In view of the possibility of the station being required for the

entrainment or detrainment of troops, the approaches to it must not be neglected, their nature, width, and gradient being all subjects for the report; and as, especially for entraining, it is desirable to have a halting place close to the station, any fields or other open spaces which may serve for this purpose should be indicated, and their approximate dimensions given, if they are not shown on the plan.

As regards signals, their nature should be reported on, and if the block system is in use, the various sections into which the line is divided should be explained. The means of telegraphic communication are practically part of the signalling system, and, as they are of special value in military operations, they would naturally be included in the report.

Rolling Stock.

In making a reconnaissance of a railway, it would further be necessary to report on the rolling stock, mentioning the numbers of each class of vehicle, their condition, the nature of brake with which they are fitted, and whether there is any source from which their numbers might be supplemented. To report upon the condition of a locomotive is a matter which is rather more than can be expected of everyone; but there are some Officers now serving who have had an opportunity of going through a course of practical instruction in the engine shops of some of our great railway companies, and who have gained a valuable knowledge of the locomotive by working with their own hands on the engines sent into the sheds for repairs.

It is not difficult to imagine circumstances in which knowledge of this sort might be of the greatest value; but there is no Government establishment in which a British Officer could gain the necessary instruction, and admission to the workshops of a railway company is a favour which is not granted indiscriminately. In most cases, therefore, the portion of the report on a railway which deals with the locomotives must be second-hand, and it must only be hoped that an Officer receiving such a report from an expert would have sufficient acuteness to judge of its value tolerably correctly.

The condition of other classes of rolling stock and their suitability for military purposes are matters which are within the competence of most Officers to estimate, the great points being the strength and soundness of the flooring of vehicles intended to carry horses and guns.

The foregoing are the principal points on which information would ordinarily be required in making a reconnaissance of a railway; but, under certain circumstances, it might also be necessary to examine the country in the neighbourhood of the various stations, either as to its furnishing camping grounds for troops, or else as affording a position for defence, if the stations should become objects of attack by the enemy's forces.

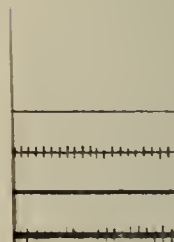
Under other circumstances, the reconnaissance of a railway might include a survey of the country near a tunnel, in order to determine





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an alternative route if this were blocked, or in cases where a line is guarded by a fort, how this might best be attacked; but the special object of the reconnaissance would usually indicate the points requiring peculiar attention.

Utilization of Railways.

We may now pass on to a consideration of the utilization of railways in war; and, as in civil life railways afford the means of conveyance for passengers and for goods, so in war do they provide for the conveyance of troops, and for the conveyance of stores.

As the subject of the conveyance of troops by railway has been recently discussed by me in the pages of a military periodical,¹ I do not propose on this occasion to refer to it at length; but it may be observed that the great value of railways in this point of view is the power which they give of concentrating very large forces at a place of strategical importance with certainty and rapidity. In former days, when such concentrations had to be effected by long and toilsome marches, troops intended to take part in them had to be set in motion weeks or months before the appointed time; but now the same distance can be covered by the help of railways in a day or two, and the hour for the arrival of each unit can be accurately laid down.

Railways may be used, as they were in 1866, for transporting large forces from one theatre of war to another in the course of the same campaign; but the circumstances under which their strategic value would probably be most conspicuous would be where one Power is engaged in hostilities with two other Powers whose railways are not in connection. Thus, for instance, if Germany were at war at the same time with both Russia and France, she might first deal a heavy blow to one assailant, while holding the other in check; and then, by means of her railways, rapidly bring a preponderance of force to that side where before she had been weakest.

In tactical movements of troops, railways have not yet taken an important place. They were used in a few instances during the Franco-German war for bringing up troops to take part in an action, but the opportunities for employing them must be rare, and no change in tactics has been brought about by the possibility of utilizing them.

When, however, we examine the question of the utilization of railways for purposes of supply in war, we find that their importance is very great. They permit operations to be undertaken which under the old conditions could not have been thought of, by enabling large armies to remain concentrated for long periods at a time. Under the old conditions, even in rich countries, it was impossible to avoid a greater or less dispersion of the Army Corps, Divisions, or Brigades for convenience of supply, and it was only on the eve of a general action that the Army was united. But in the Franco-German war

¹ See paper by Colonel J. S. Rothwell, "United Service Magazine," December 1891, and January, 1892.

we find German armies of great size engaged in the sieges of Metz and Paris, and it is quite certain that if the besiegers of the latter had not been able to utilize railways for supply purposes, they must have been starved out themselves.

In the Crimea, with sea transport to within a few miles of our camp, we learnt a good deal on the subject of the difficulties of supplying an army while it remains stationary in an exhausted district, and in these days, when the wants of an army are greater than they were forty years ago, it may confidently be predicted that when the line of communication is long, no siege on a large scale can be undertaken with any hope of success, unless the besieger has good railway communication to within a short distance of his camp and batteries.

There are two principal means by which a hostile force may be debarred from utilizing the railways of a territory which it has invaded, that is to say, by fortresses, and by the demolition of the lines. In the case of the German movement on Paris, the route by Saarbrücken was effectually blocked by the fortress of Metz, which also guarded the northern line through the Vosges by Hagenau and Saargemünd, while the southern route was similarly barred by Strassburg, Schlettstadt, and Belfort; but the central route through the mountains by Saverne was protected by no defensive works, as it branched off before reaching Strassburg, and passed fully 2 miles from the fortress of Pfalsburg, while in the whole extent from the Vosges to Paris it was only guarded by the fortresses of Toul and Vitry.

Vitry made no resistance, and when Toul was captured, on the 23rd September, the Germans had little difficulty in making the line available, at first to Nogent l'Artaud, near Nanteuil-sur-Marne, about 40 miles from the line of investment, and afterwards to Lagny, by which the road transport was reduced to 9 miles. The German Army before Paris, which was over 120,000 strong when the city was first invested, and was afterwards increased, was thus almost entirely dependent for its supply on one line of railway, which for a length of nearly 300 miles passed through hostile territory.

As it was quite impossible to watch the whole of this long line, the German system was to guard the most vulnerable points, such as bridges or tunnels, and, when any damage was done, to inflict the most severe punishments on the offenders. By the regulations in force, any person caught in the act of injuring a railway or telegraph line was brought before a Court-martial, which was not authorized to inflict any other sentence except instant death; and the commune to which the offender belonged and that in which the outrage occurred were each fined to the full amount of their annual taxation.

But as there was always a possibility of serious damage being caused, either by a pre-arranged "accident" or by means of some concealed mine, placed beneath the rails so as to explode on the passage of a train, it was customary to "invite" one of the most influential inhabitants of the town to accompany each military train;

and these gentlemen, who from one town such as Reims were sometimes as many as twelve per day, were either obliged to travel on the engine, or, under more favourable circumstances, were allowed to occupy a compartment with the German Officers.

Traffic over the hostile lines being thus secured so far as was possible, trains could be made up at some far-away German station, and a continuous stream of traffic could be sent direct to the spot where the supplies were required, while the same direct communication was equally advantageous in removing sick, wounded, and prisoners from the Army in front, and in distributing them to the places in the home districts where they could be conveniently disposed of.

Such a system, however, is only possible where the gauge of the railways of both States is the same. If the lines of the two countries have different gauges, it is hopeless to try to accommodate the rolling stock of one to the other. Attempts have been made with shifting axles, or by lifting the superstructure of loaded wagons on to a set of wheels of the new gauge, but no very satisfactory results have been arrived at; and in any case, even if wagons could be so treated, the locomotives could not be made interchangeable. It follows, therefore, that wherever there is a break of gauge, the military force which proposes to utilize the railway beyond this point must adopt one or other of two alternative courses: either a great dépôt must be formed at the point where the break of gauge occurs, and where all freight must be transferred to vehicles capable of running on the advanced section of the line, or else the gauge of this section must be altered so as to enable the rolling stock of the home railways to traverse it.

Where the change of gauge occurs on the frontier between the two contending States, the objections to the first course are manifest. The invading army can seldom hope to secure a large quantity of rolling stock in the country invaded, and thus, while the army in its advance would be ill-supplied, there would be at the frontier a vast accumulation of stores, which, in the event of a reverse, would be liable to capture. The best course to be adopted under such circumstances would, therefore, be a conversion of the gauge to suit the invaders' rolling stock.

It has been mentioned already that the principal European States which have not adopted the normal gauge are Russia and Spain; and if ever hostilities should break out between Russia and Germany, this question of the difference of gauge will have considerable prominence. The gauge generally adopted in Russia is 5 feet, but on most of the lines on the left bank of the Vistula the gauge is the same as in Germany. If then Russia proposed to invade Germany through Poland, she would have the advantage of the break of gauge occurring well within her own territories, and not on the frontier, and she would also be in possession of a certain amount of narrow-gauge rolling stock. But, if a Russian Army were to invade East Prussia, the break of gauge would here occur on the frontier, and Russia would find before her the two alternatives mentioned just now; that is to say, she must either re-arrange all the transport at the frontier

stations, or alter the gauge of the German lines to suit Russian carriages.

In the event of a German invasion of Russia, the conditions for railway transport would be more favourable to the invaders than in the case where the Russians invade Germany. If Germany should invade that part of Poland lying west of the Vistula, the question of a difference of gauge will not arise, except for a movement against Ivangorod from Southern Silesia. A German force, however, operating from East Prussia against Kovno or the eastern portion of Poland, or the main German Army endeavouring to push on east of the Vistula, will at once meet with the difficulties connected with a break of gauge, and it appears most probable that these difficulties will be overcome by making the gauge of any Russian line which may be occupied capable of carrying German trains; that is, by reducing the distance between the metals from 5 feet to 4 feet $8\frac{1}{2}$ inches. This is a sufficiently easy operation, as the Russian lines are laid on the plan generally adopted on the Continent, of fixing Vignoles rails by pins direct to the sleeper without any chairs being used, and it has been proved that the shifting inwards of one line of metals for a space of $3\frac{1}{2}$ inches can be performed quite as rapidly as an army is likely to advance, *i.e.*, at the rate of about 12 miles per day.

The converse operation of widening the gauge by $3\frac{1}{2}$ inches, which the Russians would have to carry out in order to utilize the German lines in districts which they might have invaded, would probably be much more difficult; for, though there would presumably be sufficient length of sleeper to allow of the change in the position of one rail, it does not follow that the wider vehicles would be able to pass the bridges and tunnels which have been constructed merely to accommodate those of the narrow gauge.

It thus appears that in those cases where a State such as Russia or Spain has deliberately chosen a gauge for its railways wider than that used by its neighbours, it does not thereby secure immunity against invasion. The Power with the narrow-gauge railways can, with a little trouble, utilize any of the broader-gauge lines which may be of service to its invading troops, while, on the other hand, if the Power with the broader gauge should become the invader, the narrow-gauge lines which its army would find beyond the frontier might be of comparatively little value.

In our own case, as has been mentioned already, there are but few places where we connect with the railways of another State, and in these particular instances there is no break of gauge; the American lines connecting with those of the Dominion of Canada being, like the latter, of the normal 4 feet $8\frac{1}{2}$ inches gauge, while throughout South Africa only one gauge has been adopted, *viz.*, 3 feet 6 inches.

It is somewhat remarkable that while the group of Colonies and States in South Africa have thus agreed on an identical gauge, greatly to their mutual advantage, no such uniformity is to be found in our Australian Colonies, where South Australia and Victoria have adopted the 5 feet 3 inches, or Irish, gauge, New South Wales the

normal English gauge, and Queensland the 3 feet 6 inches gauge. These lines are all now in connection, but their military value, as a means of rapidly reinforcing a threatened point by troops from a neighbouring Colony, is considerably reduced by these breaks of gauge.

In India this same question of the break of gauge has been the subject of much controversy, and is of serious military importance. Indian railways have been, and may be, utilized for military purposes on a scale of which we have had no experience in this country, and in any large movement of troops there, made under the pressure of actual or impending war, the fact that two distinct gauges exist is likely to make itself felt injuriously. It is true that the great strategic lines are laid on the 5 feet 6 inches gauge, but many of the secondary lines, which might have considerable importance under such conditions, are laid on the metre, or 3 feet 3·37 inches, gauge, and these secondary lines are scattered over different parts of the peninsula, and are not in connection with each other. Even in countries where the gauge is uniform, it has been found that the main difficulty in the way of utilizing railways for military purposes is either that the supply of rolling stock of a particular description is deficient, or else that the rolling stock required is not at the place where it is wanted, and it is hardly necessary to observe that in a country which possesses two railway systems with different gauges this difficulty is likely to be intensified. If all the railways in the plains of India had been of the same gauge, even though some were of less solid construction, like certain of the "light railways" recently laid in Ireland, the military advantages would have been very considerable, and the cost of construction, according to a high authority,¹ would have been little greater than that for metre-gauge lines. These light lines might then, in some cases, have afforded an alternative route between important centres, and this route, even if it were not directly utilized for the transport of troops or stores, might have been of great convenience in sending back empty rolling stock, while, in other cases, such lines would have permitted rolling stock to be transferred from one district to another, according to the requirements of the transport service. As it is, however, the two systems are absolutely distinct, and for military operations on a large scale the one can afford but little help to the other.

Reference has already been made to the gradual approach of the Russian and Indian railway systems, and it may be observed that, as the line which we have now pushed on through the Kojak tunnel to New Chaman, 72 miles from Candahar, has been constructed on the 5 feet 6 inches gauge, it follows that, if this railway ever joins the Russian line of 5 feet gauge, any advantage which may be connected with the difference of gauge will not be on our side.

Before quitting the subject of the utilization of a railway in war, there is one other point which may be mentioned, viz., the employ-

¹ J. Wolfe Barry, Esq., C.E.

ment of a railway as a road for the march of troops. Short sections of a line may be used in this way, as where a railway affords the best or only means of crossing a river or a morass, but except for infantry, or small bodies of cavalry, a railway is so much inferior to an ordinary road that it is not usually to be counted on as a means of communication.

Destruction of Railways.

It now remains for us to consider what is called the "destruction" of a railway in war, and it may be incidentally observed that this term, though in general use, is extremely inaccurate. No railway has ever ceased to exist in consequence of injuries inflicted on it in time of war, and though its traffic may be suspended for a longer or shorter time by reason of those injuries, it would be quite as logical to say that a soldier who goes into hospital with a broken arm is thereby "destroyed" as to apply this term to a railway which has had some of its rails and sleepers removed. The term, however, has been so generally adopted, both when the damage is of a nature which can be repaired in a few hours, and when it is so serious as to render the line useless during the remainder of the operations, that we must continue to employ it.

Between the two extremes thus indicated, there are numerous measures, of greater or less efficacy, which may be taken to prevent an enemy from making use of a particular railway at a particular time. As regards the permanent way, a good deal depends on the manner in which it is laid, but a length of the line may be taken up, a large fire made with sleepers, fences, and dry wood, so as to heat the rails, which, being laid on top, are then easily bent out of shape. If, while hot, the rails are twisted, in addition to being bent, they cannot again be used without being passed through the rolling mill.

In cases where the line is double, an interruption to the traffic thus caused would not be of long duration, for if a gap, even of a mile, was found to exist in the permanent way, it would not take long to take up a similar length of one of the lines of way, and relay it at the place where the gap has been made, the line being worked as a single line until an opportunity occurs for restoring it completely.

On single lines, however, especially if the place selected for attack is on a curve, and if the materials for repair have to be collected and brought from some distant point, the time which may elapse before the line is again in working order might be so considerable as to produce important results, and, in 1870, the Germans adopted the plan of keeping trains ready, laden with rails and sleepers, at certain central stations in a district where the line was liable to attack, so that they might be dispatched with the least possible delay, when an injury to the line was reported. It is now stated that the Germans propose in future, under similar circumstances, not only to keep ready rails and sleepers, but also to have at hand the means of bridging culverts or any small openings which may have been made in more important works.

The destruction of the buildings at a station is generally of little

use, but much mischief may be done in a short time by a raiding party who devote themselves to cutting the telegraph wires, breaking the telegraph instruments, removing points and crossings, and destroying the arrangements for the supply of water. This matter of water supply is one of first-rate importance to a railway, as any section which has been completely deprived of the means of watering engines is, of course, useless for the time; and if the tanks, water-crane, and pumps have been effectually destroyed, it will generally take a considerable time before any heavy traffic can be sent over the line.

Other injuries to a railway may be caused by cutting through an embankment, or by blowing in the sides of a cutting, or the end of a tunnel, but the time which will be required for re-establishing the traffic under these circumstances will principally depend on the amount of labour to be obtained, on the nature of the soil, and on the facilities for working at the removal of the obstruction from both ends simultaneously. For a lengthened interference with the traffic, however, nothing can compare with the blowing up of a lofty viaduct or the overthrow of a long girder; but the destruction of such works as these should never be attempted without the express order of the General Commanding the Army.

In all cases, the measures which are to be adopted for interfering with railway traffic must be dictated by the military situation at the time, of which the General in Command alone can judge, but the circumstances under which such interference might be necessary will generally be comprised in one of three cases, which may be stated as follows:—

1st. On the outbreak of war between two States, each will try to destroy the railways of the other, in order to hinder the mobilization or movement of his troops.

2nd. A State which finds itself invaded, or liable to immediate invasion, may destroy its own railways, to prevent them being of service to the enemy.

3rd. A state which has been invaded will try to destroy its own railways, when they are being used by the invader as a means of communication.

The first case resolves itself into a series of cavalry raids across the frontier during the period of mobilization and concentration, and the damage done will probably be confined to a removal of the rails or the destruction of some small bridge. While it is uncertain who is to be the invader, the raiders would do nothing to interfere with the permanent efficiency of the lines which might afterwards be required by their own side, and for this reason, as well as for their greater accessibility, it is usually the lines which run parallel to the frontier that become the objects of attack, while those which lead towards the heart of the enemy's territory are left unmolested.

In 1870 there was a line of railway which in the early days of the war was the scene of several attacks. This was the line from Hagenau to Trèves, which ran nearly parallel to the frontier the

whole way, the eastern section being in French territory, and the western in German. The German section was covered for the whole of its length by the Saar, while no such obstacle guarded the French section from attack, and this, in part, accounts for the fact that, while attempts were made against both sections, it was only the French lines that suffered any damage. On the 24th July a party of the 7th Uhlans attempted to destroy the line between Saargemünd and Bitsch, at a place called Bliesbrücken, but they only managed to remove some of the rails, and the other attempts which were made at this period met with little success. As time went on, however, while the French cavalry showed little activity, the Germans continued to make raids across the frontier, and, as it was reported that the railway between Saargemünd and Bitsch was being extensively used for military transport on the 5th August, this line was attacked the same night and broken up in several places. The destruction of this railway had its effect next day, when the battle of Wörth was fought, as, if the line had been available, it might have been used to bring up the assistance which Marshal MacMahon counted on receiving from General Faily, and to the want of which the loss of that battle has been attributed.

Another instance of important results produced by an interference with the permanent way of a railway is afforded by the occupation of Pont-à-Mousson by the Germans, on the night of the 11th August, 1870. The transport of the 6th French Corps (Canrobert's) from Châlons to Metz was at this time in progress, but, in consequence of the Germans destroying the line at Pont-à-Mousson, Dieulouard, and Frouard, in the course of the 12th August, this transport had to be suspended. The 6th corps consequently reached Metz in a very incomplete state, several batteries of artillery, most of the reserve ammunition, and all the entrenching tools of the corps being left behind; and when it came to occupy the right of the French position at Gravelotte on the 18th, these deficiencies, both in personnel and matériel, became apparent in a very disastrous manner.

As regards the second case, where a State wilfully injures its own railways from fear of invasion, there was a remarkable instance at the commencement of the war in 1870; for the Germans, being apprehensive of an invasion of Baden by the forces assembled near Strassburg, blew up the swing bridge over the Rhine, at Kehl, on the 22nd July. As events turned out, the destruction of this fine work was quite unnecessary, and it was not till the middle of the following November that the communication by rail was restored at this point.

On the French side there was at first no apprehension of invasion, and, therefore, at the commencement of the war there was no suggestion of an interference with their own lines; but, when it became known that in Germany engineers were laying numerous mines for destroying portions of the lines in that country, the Eastern Railway Company of France suggested to the Minister of War that it would be wise to do as much on their own side of the frontier, especially for the purpose of blocking the cuttings and tunnels passing through

the Vosges mountains. The excavations for the mines were accordingly made by the railway company at spots approved by the military engineers, but no steps were taken either for charging them or for arranging when they were to be exploded. Even after the news of the battle of Wörth had been received in Paris, its strategic importance was not fully realized, and it was not till two or three days later that the orders for the destruction of the tunnels were issued. By this time it was too late, for the tunnels on the line by Saverne were already occupied and guarded by German troops.

The result of this omission was that any attempts which were made to obstruct the traffic were of a very trifling character, and German trains were able to run into the station of Nancy on the 21st August, three days after the battle of Gravelotte.

The line between Nancy and Paris had been damaged at various places, but all these were easily made passable with the exception of the tunnel at Nanteuil, some 40 miles from Paris. This tunnel had been destroyed by means of five mines, whose explosion had brought down the casing, and allowed a large quantity of fine sand to fall; and as it was found impossible to reopen the tunnel in consequence of a further fall of sand, caused by heavy rain, the Germans were forced to make a loop line to connect with the main line beyond the tunnel. This loop line, which was about 3 miles in length, was not completed till the 23rd November, so that a delay of nearly two months was caused by this demolition.

There now remains merely the third case which has been mentioned, viz., the attempts made on lines which are being utilized by an invading army. We have already referred to the repressive measures adopted by the Germans, but, in spite of these severe penalties, Frenchmen were always to be found ready to hinder the traffic by pulling up the permanent way, or by even more adventurous enterprises. An instance of the latter class occurred on the line between Frouard and Toul, which, as we have seen, formed part of the main line of communication for the German Army investing Paris. In this section of the line, at Fontenoy-sur-Moselle, the railway passes over the Moselle valley by means of a fine viaduct of seven masonry arches; and on the 22nd January, 1871, the German troops who were guarding it were overpowered by a body of Frenchmen—called by the Germans *franc-tireurs*, but according to French accounts entitled to be considered *belligerents*—who thus obtained temporary possession of this portion of the railway. When the viaduct had been constructed, a chamber had been formed low down in the easternmost pier, and this was now charged and exploded, with the result that the pier and two of the arches were brought down, while the rest of the viaduct remained intact.

The gap which was thus formed was too wide to be bridged over with such materials as were available, and the Germans therefore decided on making an embankment in place of the arches which had been destroyed. This work was accomplished in seventeen days, during which time all traffic on the line was, of course, suspended; but this interruption was less felt than it would have been previous

to the fall of Metz and the northern fortresses of Thionville, Montmédy, and Mézières, as this route was now available for the supply of the troops before Paris.¹

From the difficulty experienced in re-establishing the communication across this broken viaduct, it is very doubtful if it could have been successfully accomplished supposing the mine had been exploded in one of the centre piers instead of in the one next the bank, and in the improbable event of our Engineers having to prepare a chamber for a similar purpose, the experiences at Fontenoy-sur-Moselle may be instructive.

The irritation of the Germans at the destruction of this viaduct was very great. The village of Fontenoy was burnt, a fine of ten millions of francs (400,000*l.*), to be paid within eight days, was demanded from the province of Lorraine, and on the day following the act, the Mayor of Nancy was informed that, unless 500 workmen were ready at the station by noon on the 24th, all factories would be closed, all public works suspended, and, in the first place, the superintendents, and afterwards some of the workmen, belonging to the factories in the town would be shot. It is, perhaps, needless to add that the working party required was ready at the time appointed.

Conclusion.

This examination of the reconnaissance, utilization, and destruction of railways must now be concluded. While we may feel confident that the reconnaissance of lines that are of military importance to us has not been neglected, and while we may hope that well-considered plans for the utilization of our railways in time of war will be ready whenever an emergency may arise, our most patriotic aspiration is that the course of any military operations on which we may be engaged will never take such a turn as to lead to the destruction of a single yard of a British railway.

Captain H. HULEATT, R.E.: I hope Colonel Rothwell will forgive me if I differ with some of his conclusions. I want to take exception to the first paragraph of the paper; that is the one in which he says "it is rare in this country to find any Officer who has had experience in executing a reconnaissance of a railway." I think when he wrote that he must have forgotten my own corps, because it is part of the course at Chatham that every Officer shall be instructed and practised in making these reconnaissances. It was so when I went through, and I believe it still is the case, that every Officer makes a general reconnaissance of a piece of line. Afterwards he is given a piece of railway for the destruction of which he has to prepare plans, and then some other Officer has instructions given him to show how the line when so destroyed can be again utilized. I think, therefore, I may say that we are practised in making these reconnaissances in peace-time, and all the instruction for it and the information necessary is laid down in our text-books. Besides that there are a very large number of Officers employed on railways in India, and they gain experience of all sorts of railway work. We have two railway companies at home, and a great deal is done to instruct them in this work. Dealing with railway reconnaissances as a whole, Colonel Rothwell gave us one

¹ Mézières, the last fortress blocking this route, had capitulated on the 1st January, 1871.

list of details that we are to observe practically under most circumstances. I was in hopes before I read the lecture that Colonel Rothwell would have divided it rather more and have distinguished between three different sorts of reconnaissances to be made of railways. There is first the general reconnaissance to get all the information possible, and that would be made before the outbreak of hostilities if possible. Then there is the reconnaissance simply with the view of destroying a railway. And, thirdly, there is the reconnaissance of a railway which it is desired to utilize after repairing it, if necessary. I think it is apparent that the kind of reconnaissance to be made would be very different in each of these cases, that we should observe and record different particulars in each of the three cases, and it would be very desirable to have them laid down. For instance, you might take the case of a stock of coal; if we were going to utilize a railway it would be most essential to know what stock of coal there was in a particular place, but if we were going to destroy the railway it would not matter much. If we were taking a general reconnaissance of a railway some months before we were going to use it, the existence of a stock of coal there would be no guarantee that it would exist when we came to want to use the railway. So that I think these three classes of reconnaissances should be kept distinct, instead of being lumped together as they generally are. Then as to the details given. I believe the definition given of "permanent way" is not a good one. I am not speaking on my own authority, but I think that, although it is correct, as far as it goes, it is liable to be misunderstood. "Permanent way" ordinarily includes only the actual rails, sleepers, and their fastenings, such as fish plates, fish bolts, spikes, chairs, and so on, and possibly ballast. In no case does it include bridges or embankments, as might have been thought from the definition given in the lecture. Then as to observing the details of the permanent way, the form of chair was mentioned in the lecture but not the form of rail. I think it is very much more important that the actual form of rail should be noticed and its connection than the form of chair, because it gives us a guide to the weight of the permanent way. If we know the rail we can make some other chair to suit it, whereas the form of chair is really of very little importance. Another thing of more importance is the dimension of the spikes and bolts; it is very awkward to find yourself with inch bolts when everything has only $\frac{3}{4}$ or $\frac{7}{8}$ holes. Then, as to the gradients, I understood from this lecture that we were to observe all gradients, to see which way they fell and to get a great many details about them. I do not think it is the case in all foreign railways that the gradients are marked, so that this would involve a great deal of labour, and it does not appear to serve any useful purpose. It seems to me that if we knew the severest gradient in each direction that would be amply sufficient. It might be desirable to observe two or three of the severest gradients, but I cannot see any reason for observing the minor gradients; it appears to me to be a waste of labour. There is one point missed out that is really of very great importance, and that is observing the smallest curve. Supposing we have to bring rolling stock from a different railway, as has been done once in my experience, this is a very essential point. On the Nile, for instance, we brought rolling stock from the Cape, and it might happen if we brought rolling stock from a straight railway on to a curved railway it would not run. It is, therefore, very essential to notice the smallest curve. It is very easy to measure on the ground. All that has to be done is to stretch a 50- or 100-foot tape across the curved rail so as to form a chord of the arc, and notice the distance between the centre point of the tape and the middle point of the curve and the radius can be worked out. Then as to locomotives. I think it is scarcely possible that they could be fully examined in any reconnaissance as ordinarily understood, that is, in any reconnaissance done in anything like limited time. If a locomotive is obviously broken down it is easy for any Officer who has worked on railways to say that the locomotive could not work, but the locomotive might be apparently perfect and yet it would be quite impossible to say whether it would work without getting up steam, and trying the locomotives under steam would take a considerable time. But I think if steam was up, many Officers would be able to ascertain whether it would work or not, and what repairs were likely to be required. Then the lecturer does not mention the height of the floor of the trucks. It is a very essential point in connection with

platforms, gun ramps, &c., that we should have the height of floor above the level of the rail. Also with regard to the wagons, the way in which they open should be ascertained. If possible, in the case of a reconnaissance of the third-class where one is going to utilize a railway, it would be very desirable to know in what condition the wheels and axles, and the arrangements for lubrication, were; that would make a great deal of difference when we came to run them. Then there is the question of break of gauge, and this is a very complicated question, and almost deserves a lecture to itself. I am bound to say the conclusions I came to after careful consideration and study were exactly opposite to the conclusions of the lecturer; my conclusion was that it would be generally better to make arrangements for the transfer of freight from one gauge to another, rather than to narrow the gauge. I do not know how "it has been proved," that you can alter the gauge at the rate of 12 miles a day. I am rather in the dark as to what the proof is, but it appears to me unless it was a simple plain line of rail without any points and crossings, it would be exceedingly difficult to go at that pace. We make a great many points and crossings in Woolwich Arsenal, and I do not think it would be possible to alter each set of points and crossings from one gauge to the other in less than half a day at the least. To do it you would want a gang of about ten very highly trained men, and you would be lucky if you could do it without having to put the rails on a machine. Of course the straight part of the railway would be of no use unless you could alter the junctions and passing plates. Then, again, it often happens that on a large bridge, or long viaduct, the rails are laid in troughs, and it would be necessary before narrowing the gauge to raise them out of the trough, and you would have to block them up in the trough, and that would involve altering the gradient. I think the time required would be very much longer than that given in the lecture: it would require a very large number of men not always easy to get, and a great proportion must be skilled railway workmen. No doubt it would be easy on our own lines, but I doubt whether we should get the necessary number of trained railway workmen in a hostile country unless we brought civilians with us from England, and that has not always been a success. Another point which would affect the question very much is the comparative length of the lines of the two gauges required to be used. If the piece to be altered is 12, or 30, or 50 miles, it might be worth while narrowing the gauge, but, supposing you are hoping to run over the whole country, it appears to me it would be rather useless to begin to alter the gauge. It might be worth while altering the gauge to a town you are going to besiege, in order to bring up the heavy siege-train, but I do not believe it would be possible to follow a field army. Directly the General had to move off the line prepared, the railways would become useless, whereas if you had made arrangements to get rolling stock, wherever the railways of the country ran, you could follow the army with your trains. Supposing you capture your town, any rolling stock you might acquire would be useless if you altered the gauge, whereas it is a great gain if you are going to use the lines as they are. I believe the Germans captured somewhere about 16,000 wagons in Metz, and if it had been a case of altering gauge, they would have been no use whatever. Then, also, supposing your lines are laid with steel sleepers, you cannot alter the gauge, or at least not without much heavier labour. If, on the other hand, you make a transfer station, you have the advantage of doing your work in territory which is comparatively safe from interruption from the enemy. You are able to employ unskilled labour instead of skilled labour; and once you get your stores on the truck it can go anywhere over the country that you are attacking. It has very often been done. It is quite possible to imagine that even if we could not capture rolling stock immediately on the frontier with our Fleet, we could capture rolling stock at some other parts of the country and bring it round. In the war of 1882 we captured rolling stock at Alexandria and took it round and put it on the rails at Suez. We found very little stock at Ismailia when we arrived, but we brought locomotives round, and used them. Then there is one more point on the question of the utilization of railways, and that is what the lecturer says about not using a railway as a road. There I agree with him thoroughly, but I go a great deal further. Not only does a railway make a bad road for troops, but the passage of troops is very bad for the railway. I was in the Railway Company in 1882. We

had to meet many difficulties, but I do not think there was anything more heart-breaking than to find the little heap of sand which had been left on the rails by a cavalry regiment crossing, or by an infantry regiment having walked along the line. If you were lucky enough to see it in time, you had to wait while it was scraped away. If you were not lucky, you went over it and very likely one or more of your wagons came off the road. Between the 29th August and the 14th September, we had six accidents due to troops crossing the line—absolutely directly due to that without any other cause. I do not know what the amount of delay was; it was impossible to estimate it, but I can vouch for the fact of its having taken place. We were fortunate enough not to damage our engine in any case, but, supposing an engine had been disabled, the detriment to the carrying power of the railway would have been enormous. Then there was another point with regard to the utilization of railways which was not touched on, viz., the question of not using railway trucks as store-houses. Nothing upsets traffic, diminishes the carrying powers of a railway, and disorganizes the work so much as the habit of loading trucks before people know where they are going to, and leaving them loaded after reaching their destination. I believe a great many of the French difficulties in 1870 were due to that. The capture by the Germans of so many trucks at Metz was due to mismanagement of different sorts, but one reason among others was that the French had a great deal of difficulty in working the traffic because all the sidings were blocked in with wagons. At the time of the fall of Metz there were no less than 7,500 wagons standing on one line of railways, the Paris, Lyons, and Mediterranean, loaded up and utterly useless, because nobody knew where the stores on them were intended to go to. It is a thing that does not depend only upon railway Officers, and the avoiding of this fault cannot be too strongly insisted upon in all discussions on the utilization of railways.

Admiral LONG: Though I am entirely unacquainted with all the details of railroads, it occurs to me there are one or two points in the very interesting lecture of Colonel Rothwell's about which I might say one or two words, to make the discussion more complete. Colonel Rothwell has not alluded to the possibility of railways being used for coast defence, which I believe is now one of the things that is contemplated. By placing quick-firing guns on trucks, they could be brought up to the scene of action very rapidly. And I think another thing we must remember is the possibility of an important part of a railroad being destroyed from the sea. We have now the Forth and Tay Bridges as conspicuous instances in this country, and there are several places both in England and Italy, and, I think, in France and Spain, where railroads run for some distance near the coast. I have lately been reading a work treating of the possibility of destroying coast towns, in which it is pointed out that explosives may be thrown in very readily by cruisers. I think that portions of a railroad might very likely be destroyed from the sea in that manner. We read that in the Peninsular War some of our ships did very great service by obstructing the passage of French troops along roads. The frigates used to lie off them, and if they saw anybody going along fire at them, which was found to be a very great obstruction.

Captain GRIERSON, R.A., D.A.A.G., Intelligence Branch, War Office: In the beginning of Colonel Rothwell's lecture he said that the reconnaissance of a railway could not be accomplished from a train. No doubt a detailed reconnaissance of a railway cannot be accomplished from a train, but there are many cases in which you have to do it in that way. In work in connection with reconnaissance abroad, it is in many cases impossible for various reasons to go along the railway and make a reconnaissance on foot. It is, therefore, of great importance that we should practise the reconnaissance of railways from trains. A great deal can, I think, be done in that way. You have guide books, you know the distance between the stations. By the use of your watch and time tables you can tell the rate the train goes at, and by noting where the bridges are passed you can arrive at an idea of their position, which can be checked afterwards by maps on a large scale. Moreover, by craning out of the window you can see the bridges, and you can occasionally look back along curves, and in that way certain points of very great value can be noticed from a train. In a great many foreign countries the trains, as I think we all have had reason to remember, go very slowly and stop a long time

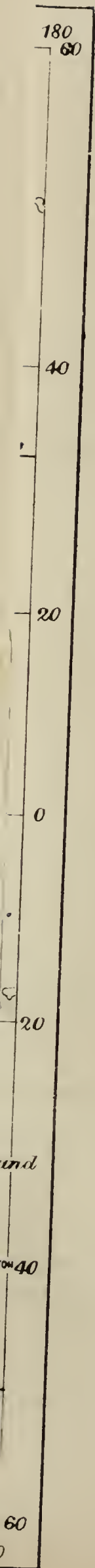
at a great many stations. During those stoppages there is ample time for measuring platforms, counting the number of sidings, and making notes generally upon the stations. I think Colonel Rothwell's lecture has brought out the enormous importance that ought to be attached now-a-days to the larger development of railway troops. Since the last war this development has been very marked in all countries of Europe. I am not quite certain whether the Germans had any railway troops before the war of 1870, but certainly very shortly after that war they formed one railway battalion. That has since been expanded into a brigade of four battalions, and the Bavarian Company has been expanded into a small battalion of two companies. In war these would undergo a most enormous development; they would be expanded to something like four times the size. The same has been done in every other country. Russia works her Trans-Caspian Railway entirely by railway battalions. Railway battalions made that railway, and work it actually in peace. Russia also has a railway brigade, which is stationed at the important railway junction of Baranovichi, and is constantly trained in the construction and working of railways. Other nations are also largely developing this most important branch of modern armies. The reason of that seems to be that armies in the future will be so enormous that they will eat up a country like a swarm of locusts, and the supply must be entirely by railway. Naturally the railway employés, and, as far as possible, the rolling stock, will be withdrawn as the enemy retires, so that the invaders of the country will have to find the personnel. We know how hopeless it is to attempt to repair a railway—I won't say hopeless, because difficulties are only made to be overcome—but how difficult it is to construct and work a line in a theatre of war by civil personnel and labour. The advantages of having a military organized body of railway troops were apparent to every one who was at Suakim in 1885, and saw those undisciplined and disorderly navvies attempting to construct a railway. I think no further proof is required that we must have railway troops under military control, under the head of the Army. Civilian labour must be under military command, and the whole thing must be worked in a military manner. I am perfectly aware we have done a great deal lately. Our Engineers have got railway companies, and arrangements have been made, I understand, though I do not know the details, for forming a reserve of railway men. One result of Colonel Rothwell's lecture, I hope, will be to direct attention to this very important question, because the circumstances in our wars are exactly the same as in other countries. We must in war rely on railways to a great extent, as we have done generally in the past and shall probably in the future; for whereas foreign armies go to invade hostile countries in such masses as to eat up the whole country, we go into countries where there is nothing to eat, and in both cases it comes to the same thing. I hope the result will be that attention will be directed to this point.

Colonel ROTHWELL: I am very much obliged for the kind way in which my lecture has been received. Captain Huleatt remarked on my having said that it was rare to find Officers in this country who had executed the reconnaissance of a railway. I may be permitted still to say that it is rare. Although the Engineers are all instructed in this form of reconnaissance, what I meant was that the number of Officers who have actually carried out a reconnaissance as a practical work is comparatively small. And, of course, I only spoke of Officers in this country, and not of those in India to whom he referred. I fully admit it would have been more convenient to have kept the different classes of railway reconnaissance distinct, but the size of the subject is so great that it was necessary to condense, as far as possible, the observations I had to make. In a report on a railway, Captain Huleatt says the radius of the smallest curve should be noted. I admit that this was an omission of mine; and I thank him for the correction. In most countries the height of the floor of the trucks would be the same, but where there is variation, the difference in height should come into the report. With regard to altering the gauge of a railway, Captain Huleatt did not agree with the view I took. My view was based on the observations of German writers, as the question is one that we are so little concerned with that I have not looked into it with regard to our own case. If we had to employ a railway in a foreign country, of a gauge different to our own, and took our rolling stock with us, we should very

likely take the rails too, and relay the whole thing. But the case has been very seriously considered by the Germans, especially with regard to Russia, which is the only country where the break of gauge would occur; and most of the German writers who have dealt with this question have given their opinion that the shifting of one line of rails would be the way in which they would meet the difficulty. Of course it would not be the case that Captain Huleatt referred to, of shifting the gauge of a whole country; it would only be of those lines which were used as lines of communication. Admiral Long spoke of the utility of railways for coast defence, and very likely they might be so used, if we were going to send a force to the coast to defend it. But in the case of an attempted invasion of this country, I cannot bring myself to believe that we shall try to defend the coast by a force sent down by rail; and I doubt whether we would send quick-firing guns, which would be certain to be overpowered by the guns of a fleet, which would cover any landing on these shores. The destruction of railways by ships of war is possible in many cases. For instance, on the shores of the Black Sea, near Batoum, I think the railway runs near the sea, and this might be a vulnerable point. Captain Grierson spoke about the possibility of reconnoitring from the train. I can only say that in travelling on the Continent, some years ago, I tried it for myself, and came to the conclusion that any results I obtained by craning out of the windows were not satisfactory. As to the development of railway troops, that is a matter that is going on extremely rapidly. I believe the German railway troops were first started on a small scale in the Danish War. Their value at the present day is very great indeed.

The CHAIRMAN (Sir Beauchamp Walker): I do not think I have anything to say in closing the discussion. I go a great deal on the old principle, *Ne sutor ultra crepidam*. I know very little about railways, and certainly shall not criticize my friend Colonel Rothwell. Admiral Long is quite right in speaking of the possibility of ships doing great damage to railways in Italy, because a great part of the Italian railways on the Mediterranean side run quite close to the shore, and are, therefore, exposed largely to fire. I was very much interested in hearing what Colonel Rothwell says about the Germans having developed the great question of how they are to act in the case of an invasion of Russia, because I perfectly remember before I left Germany, which is now nearly fourteen years ago, I had been told by Count Moltke himself, or by somebody very intimately connected with him, that there was only one subject on his mind as regarded the possibility of war between Germany and Russia, and that was the break of gauge. What conclusion he came to I do not know. Colonel Rothwell seems to know that there has been a good deal written on the subject lately, probably derived from some hints during his valuable lifetime. But I know that I heard him say himself, or the person who told me heard him say, "Thank goodness, I have got to the bottom of the question." He had evidently come to some conclusion which was satisfactory to himself. I think nothing further remains for me to do but to beg you all to give Colonel Rothwell a very warm vote of thanks for his lecture, and also to those Officers who have been good enough to speak in further illustration of it.





NAVAL PRIZE ESSAY.

MARITIME SUPREMACY BEING ESSENTIAL FOR THE GENERAL PROTECTION OF THE BRITISH EMPIRE AND ITS COMMERCE, TO WHAT EXTENT, IF ANY, SHOULD OUR NAVAL FORCE BE SUPPLEMENTED BY FIXED DEFENCES AT HOME AND ABROAD, AND TO WHOM SHOULD THEY BE CONFIDED?

By Captain Robert W. CRAIGIE, R.N.

“Ne sutor ultra crepidam.”

MARITIME supremacy can only be considered as a comparative term. Maritime supremacy may be termed relative as regards any one Power or absolute against the most powerful combination that is likely to assail us; for instance, to take a purely hypothetical case, that of France and Russia, so that the facts may be examined, France, being the most powerful maritime State next to ourselves, must always be considered when comparisons are made, which, indeed, should be taken as a compliment. Other things being equal, relative maritime supremacy can only be assured by a large preponderance of force; it has been laid down that for an efficient blockade the blockaders should have a superiority of at least one-third more in battle-ships and 2 to 1 in cruisers, but a reserve of battle-ships in the Channel would also be required, and also cruisers for the protection of the trade routes, so it may be assumed that to ensure a relative maritime supremacy over any one Power, a force of 2 to 1 in battle-ships and 3 to 1 in cruisers will be required.

As will be seen by Table A, we shall, in 1894, have such a relative maritime supremacy as compared with France.

For absolute maritime supremacy such a large preponderance of force is not required, because of the impossibility of two different Powers acting with the same unanimity, force, and energy as a single Power, and also on account of the scattered position of their bases; therefore, the proportion suggested as required in this case would be $1\frac{1}{2}$ to 1 in battle-ships and 2 to 1 in cruisers. On referring to the tables it will be seen that in 1894 we shall be 25 battle-ships short of this proportion, and it is a remarkable fact that France and Russia

are building together 26 armour-plated ships, while we are only building 10; it is evident, therefore, that if we wish to obtain an absolute maritime superiority we must make one more effort to do so by a well-considered programme.

The system of adopting a naval ship-building programme has proved wonderfully effective: the ships are built rapidly and cheaply, and a consistent policy is substituted for a shilly-shally; in fact, it is simply common sense, because ships cannot be built in a day, and our naval supremacy ought not to be the shuttlecock of political parties. The term of the programme should, however, be reduced to three years.

What extra force, then, is required to be built besides our annual tonnage required to keep up the Navy?

Of the 26 armoured vessels building by France and Russia, the 5 French cruisers may be considered as equivalent to unarmoured ones, the armour being so thin; this will leave 21. We shall then be only 18 short of the proportion of armoured ships, and as we can build so much faster than any other nation, 12 extra battle-ships will be quite sufficient to give us an absolute maritime supremacy over any two naval Powers, or 12 "Centurions" at a cost of 7,000,000*l*.

It is absurd to call the "Centurion" a 2nd-class battle-ship; in fact, our new 1st-class ones of the "Royal Sovereign" class are too big and too complicated, and there is a growing feeling against these unwieldy monsters, and their enormous guns worked only by machinery—a "box of tricks" as they have been well described. No truer words on naval warfare have ever been written than those quoted by Lord Brassey (p. 107) from a paper issued by the Naval Department of the United States: "Such a war, or one such battle, would prove what has long been the apprehension of intelligent Officers, that the war-ship of our day has become far too complicated for the people who may be called upon to work her; and that a balance of advantages, unsuspected by many, rests with that vessel which has comparative simplicity."

The premise of this essay, namely, "Maritime Supremacy," having been obtained by an extra effort, the subject, to what extent, if any, should our naval force be supplemented by fixed defences at home and abroad, can be considered under its two heads:—

(a.) General protection of the Empire.

(b.) Protection of Commerce.

However assured our naval supremacy may be, there is always a chance now in the days of steam of some portion of the enemy's fleet evading ours both at home and abroad; this has been clearly shown in recent manœuvres by the blockaded fleet escaping from Berehaven, in 1888, and by Admiral Seymour's squadron last year; but should the enemy approach British waters, our fleet would again be in touch with them through the intelligence system at the Admiralty, and it would be only a question of time for us to bring up a superior force to crush them, as shown by the manœuvres of 1889.

What then would be the limiting value of the portion of the enemy's fleet thus threatening our shores? There are three very

distinct and impassable limits to the offensive powers of this fugitive force pursued by a superior one, namely :—1, time ; 2, coal ; 3, ammunition.

As regards time, the outside limit to attack any one place in the United Kingdom can be taken as four days, for in that time a force could be sent from the Scilly Islands up either side of Great Britain and concentrated on any required point.

But would the enemy remain four days at any one place, expending his coal and ammunition, and knowing that then he would be certainly caught? No, the longest he would stay would probably be two days ; so the question is, What damage could he do in that time? Would he land? The number of men available for landing purposes in a modern man-of-war are few compared to what it was in the sailing days, and though they might be accompanied by one or two troopers, with 1,000 to 2,000 men, there should be no difficulty in concentrating a sufficient force anywhere in Great Britain to drive them back, and in any case there would be a great risk to the enemy, since he is liable to be caught with all his men on shore. Would he bombard? Here again he is limited by his ammunition ; how much would he be able to spare for bombardment in view of an imminent action with a superior force? It would certainly not be much, and might be computed as about twenty rounds per gun. We might safely say that a bombardment under these circumstances would not do much damage if proper precautions are taken to prevent fire and keep order. Would he confine himself to chasing merchant steamers? Here his limit of coal would be felt, and he would not have much to spare after a couple of days' hard chasing.

The result of this reasoning is that in all probability a squadron of the enemy's ships would threaten to land his men or bombard, but would do little else in the United Kingdom.

There is, however, another limit to be considered, and that is, what force an enemy would risk losing altogether, provided it had attained its required object? This must depend on the value of the object, and to estimate this the seaports of the United Kingdom are divided into four classes. (Table B.)

1. London and naval arsenals.
2. Commercial towns of the greatest importance, such as Liverpool and Glasgow.
3. Commercial and other towns, such as Bristol and Aberdeen.
4. Smaller towns with good harbours, such as Dartmouth and Falmouth.

London and the great naval ports of Sheerness, Dover, Portsmouth, Portland, Plymouth, and Pembroke are of such vast national importance that an enemy would be prepared to make great sacrifices in order to damage them seriously either by bombardment or landing ; the limit in this case might be placed at one-tenth of their armoured force, or six battle-ships, with two transports containing 2,000 men. To meet a determined raid of this force it is evident that a fortress is required with armoured batteries, &c., with troops sufficient to meet 3,000 men, 1,000 from the battle-ships and 2,000 from the

transports, who might land and try to burn and destroy the arsenal, docks, &c.

Coming now to classes 2, 3, and 4, what force would be risked to destroy them? This would certainly be only of unarmoured cruisers; and taking again a force of one-tenth of their cruisers, we may put down 4 as the largest number they would risk losing in order to do serious damage to a place like Liverpool; for Bristol, 2, and for Dartmouth, 1.

The strength of four unarmoured cruisers may be taken as follows:—20 6-inch guns on each broadside. 400 men for landing party.

They would probably be accompanied by one transport with 1,000 men.

Two cruisers would be half this force without the transport, and one cruiser one-fourth, or 5 6-inch guns on the broadside, and 100 men.

It is not possible to give the details of the defence of each place in an essay like this, but only what it should be in general terms, and so the armaments will be divided into classes like the seaports. (Table C.)

The 1st-class defence would be a fortress with armament sufficient to meet 6 battle-ships; this would be 20 10-inch guns or their equivalent in the following table:—

1 8-inch gun taken as equal to 2 6-inch guns.					
1 9·2-inch	„	„	4	„	„
1 10-inch	„	„	6	„	„
1 12-inch	„	„	8	„	„
1 13·5 inch	„	„	10	„	„
1 16·25-inch	„	„	12	„	„

Also a simple system of submarine mines protected by a sufficient number of small quick-firing guns, electric search lights, &c.

The fortresses are the following, viz.:—Thames, Medway, Dover, Portsmouth, Portland, Plymouth, and Pembroke.

The 2nd-class defence would be—

18 6-inch guns, or their equivalent.

12 6-pr. quick-firers.

Submarine mines.

The following towns and rivers would be included in this class:—

Mersey, Clyde, Tyne, Wear, Tees, Humber, Queenstown, Belfast.

The 3rd-class defence would be:—

10 6-inch guns or their equivalent.

8 6-pr. quick-firers.

Submarine mine defence.

The following towns and rivers would be included in this class:—

Bristol, Cardiff, Aberdeen, Dundee, Forth, Harwich, Kingston.

The 4th-class defence would be :—

6 6-inch guns or their equivalents.

6 6-pr. quick-firers.

Submarine mine defence.

The following harbours are included in this class :—

Newhaven, Dartmouth, Falmouth, Waterford.

But the most important and most efficient form of defence is now to be considered separately, namely, the floating one, consisting of torpedo-boats and armed local steamers; it may be assumed as certain that no town or seaport will secure immunity from annoyance unless they have this floating defence, nor will they be able to keep their commerce from alarm when any strange cruiser is in the neighbourhood.

A certain number of torpedo-boats should be stationed at each port and manned locally by a volunteer crew, with two Regulars to each boat, a coxswain, and an artificer; the Naval Artillery Volunteers or, as a better name, the "Naval Volunteers," would be exactly the force to man these boats efficiently, as recently suggested by Mr. Arnold Forster; it seems incredible that any one should wish to disband this force of trained and zealous men who would turn their hand to anything; in war-time we shall be glad to get even the scum of the streets in our seaport towns, who will not only be untrained but who will not learn, and who will be a constant source of trouble.

For each fortress, 6 torpedo-boats should be localized; for towns and rivers of the 2nd class, 4 boats; for those of the 3rd class, 2; and for those of the 4th class, 1 boat; so that the total number required by the scheme would be 84 for the United Kingdom, and 91 abroad, or a total of 175.

The Admiralty have always refused to localize any of their sea-going ships, and rightly so, as it would be a dispersion and dislocation of their forces; but this does not apply to the smaller class of torpedo-boats, which are not really sea-going, and which have greater effect in a series of attacks in small groups than in one attack of a large mass together, the object being to wear the enemy out by constant vigilance.

Two or three of the fastest local steamers should also be fitted as guard boats against the enemy's torpedo-boats, armed with 3-pr. quick-firers, and manned locally by Naval Volunteers.

Practically speaking, therefore, these local vessels and torpedo-boats would form a second or inner line of defence against all raids that might elude the vigilance of the Royal Navy, and no one would care to affirm that there would be no such raids in these days of fast steamers; probably, however, they would not be attempted if it was known that these preparations had been made for their reception, and our coast would be secure from even the fear of an alarm at a minimum of cost.

The torpedo-boats and local steamers are classed as fixed defences,

because they would be strictly localized, and not be removed for other purposes, that is to say, they would be there when they were wanted, and not somewhere else.

The protection of commerce on the high seas must, of course, be the duty of the Royal Navy; but for the local defence of steamers loading or unloading, or of our men-of-war while coaling or under repair, these torpedo-boats, coast batteries, and mine-fields would be of the utmost value, especial attention being paid to the defence of the shipping against torpedo-boats by means of the electric light and quick-firing guns. Such is the great strain of modern naval warfare that our war-ships while at anchor in their own harbours should feel comparatively safe and their crews able to rest themselves, or else their vigilance and energies would flag when most necessary.

The fixed defences abroad will now be considered; are they required, and to what extent?

The primary reason why we maintain stations abroad is for coaling and repairing our ships-of-war; and, secondly, for coaling merchant steamers, and to give them places of refuge in the event of a stray cruiser being in the neighbourhood; for these reasons, therefore, fixed defences, including the floating ones already described, will be required, the amount depending on two considerations, viz.:—

1. The importance of the place.
2. The proximity of an enemy's base.

The importance of the place depends almost entirely on the trade routes in war-time: if there was a combination of France and Russia against us, would it be possible to maintain the Suez Canal route? It might be possible, but certainly not advisable for the following reasons:—

1. For one-half of the way in the Mediterranean it would pass at a short distance from hostile territory on either side, with numerous ports to shelter the enemy's cruisers.

2. To protect it would absorb an undue proportion of our own cruisers.

3. If anything happened to the Canal suddenly, which is a most likely thing, there would be a great block along the whole line.

Let it, therefore, be assumed that, at any rate at the commencement of war with two great Powers, the Suez Canal route would be restricted to troops, mails, and military stores, and the rest of the trade would be sent round the Cape, where it would be comparatively safe; this brings the coaling stations on that route into much greater importance than at times of peace.

It may be here pointed out that while our merchant steamers can coal without restraint at a neutral port, our cruisers cannot do so, and hence the importance of coaling stations near the trade route, if they are not actually on it.

Let us now trace all the trade routes, mentioning all our coaling stations on or near them, and also all the enemy's ports in a similar position, taking the hypothetical case of a combination of France and Russia as before us.

1. *Mail Route and Transports.*

Gibraltar, Malta, Famagousta, Perim, Aden, Kurachi, Bombay.

Enemy's ports: Toulon, Marseilles, Algiers, Boma, Tunis, Obock.

Here we have Gibraltar and Malta within easy striking distance of Toulon, where the whole strength of the French Navy is concentrated; accepting the principle that the enemy's ports in modern warfare will be watched by cruisers only, while the main body of the blockading fleet is at a base, Toulon presents a difficult case, unless Corsica is seized, as both Gibraltar and Malta are too far off; under these circumstances a portion of the enemy's battle-ships might escape, and make a raid on either of those places, accompanied by one or two transports; the limit might be taken as before, six battle-ships and two transports, but the time would be extended to seven days.

Gibraltar and Malta will therefore require a 1st-class or fortress defence, the former with a garrison of 3,000 men, the latter of 6,000.

Famagousta seems of little use to us as long as we hold Egypt, and it is far from an enemy's port, so that a defence of the 4th class will be sufficient, as it is only likely to be attacked by a stray cruiser. We should, however, be stronger in the Mediterranean without Cyprus.

Perim and Aden are near Obock, but this latter place would be speedily taken, so that the two former have to be considered with reference only to their importance, which would put Aden in the 2nd and Perim in the 4th class.

Neither Kurachi nor Bombay are within striking distance of any base but the former, as the base for our Army at Quetta should have a 3rd-class defence, and Bombay, from its great commercial importance, one of the 2nd class.

It is not for a moment proposed that our fleet should evacuate the Mediterranean; such a weak and pusillanimous policy would be a national disgrace and shame, and the prelude to the downfall of the Empire; we must, and we can maintain our naval supremacy there against any probable combination; all that is here suggested is that, at the commencement of war, our India and China trade should be diverted round the Cape, keeping the Suez Canal route for mails, troops, and stores, which would be sent overland if anything happened to the Canal; our fleet in the Mediterranean would then be free to defeat and destroy the enemy's fleets, and sweep the sea of all privateers under their modern guise of volunteer fleets; this being done, our trade can resume the Canal route in safety and comfort, and all panic will be avoided.

The difference of distance [from Plymouth to Colombo, *viâ* the Cape and *viâ* Suez, is only 4,000 miles, or thirteen days for an ordinary, and ten days for a fast, steamer.

2. *China Trade Route.*

Having frankly given up the Suez Canal route, at all events at the commencement of war, this route will be as follows:—

St. Vincent, Ascension, St. Helena, Cape, Mauritius, Singapore, Labuan, Hong Kong.

Coaling stations, not on the main route: Gibraltar, Gambia, Sierra Leone.

Enemy's ports, near the main route: Goree, Gaboon, Réunion, Diego Suarez, Saigon.

Gibraltar would be the base for the protection of the route between Cape Finisterre and St. Vincent, with a temporary coaling station at Cape Blanco, on the north-west coast of Africa.

The Gambia is surrounded by the French territory of Senegal, where there is a force of 2,000 men; so that, unless an equal force is stationed at Bathurst, it must fall.

The great importance of Sierra Leone is hardly appreciated; it is the only coaling station for our cruisers protecting the trade route between St. Vincent and the Equator, which is threatened by the great fortress and arsenal of Goree, only 300 miles distant from the present peace route and 400 miles from the proposed war route, while Sierra Leone is distant 250 and 480 miles respectively from each; it is also within 500 miles of Goree, and is, therefore, exposed to a sudden raid by the troops stationed in Senegal.

It has a splendid harbour, and is easily defended, and should, therefore, have a defence of the 2nd class.

After passing the Equator, on as far as the Cape, there is little danger to the trade; Gaboon is the only port, but this is 1,200 miles from the war route, which can easily be protected from Ascension and St. Helena; these islands should each have a defence of the 4th class.

At the Cape we have Cape Town and Simon's Bay; these ports are not threatened by any of the enemy's, but from their importance, the first as a commercial centre, and the second as a naval arsenal, they should each have a system of defence of the 2nd class.

Between the Cape and Mauritius there is danger from Réunion, and after leaving Mauritius the route is threatened by Diego Suarez, on the north-east coast of Madagascar, both of which places would have to be taken as soon as possible after the outbreak of war.

Mauritius, being only 136 miles from Réunion and 600 miles from Diego Suarez, will require a 2nd-class defence.

After passing the Equator, the route can be efficiently protected from Diego Garcia, one of the Chagos Islands, as a base, with a defence of the 4th class, and there will be no danger until it converges on the Straits of Malacca, where it will have to be defended by Singapore and Penang; the latter place has been neglected hitherto, but is very important as a base for the defence of the western entrance of the Straits, and should have a defence of the 4th class; the enemy would probably use Sumatra as a base.

Singapore is a place of vast importance—it commands the highway to the East—and a dozen torpedo-boats stationed there could close the narrows at Carimon Island, only $9\frac{1}{2}$ miles wide, against any of the enemy's cruisers, which would have consequently to go round by Sunda Strait, where they would have difficulties about coal; the smooth waters of the Straits of Malacca offer every advantage and

facility to torpedo-boats. Singapore is threatened from Saigon, where the combined China squadrons of the two supposed enemies would be concentrated, and which would give ours a considerable amount of trouble. Saigon would be a difficult place to attack, but fortunately for us there is the Island of Condore just outside, which would form a most convenient base for our fleet.

Singapore is less than 600 miles from Saigon, or forty-eight hours' steaming; it would be easy for a transport to slip out while the fleets were engaged, and land 1,000 men at the back of the island; if they could get in and destroy all the coal there, something like 100,000 tons, and sink ships so as to block up the New Harbour, they would do an incalculable amount of damage, and could give themselves up afterwards if they were seriously attacked. Singapore under these circumstances should have a 2nd-class defence.

The present peace trade route from Singapore to Hong Kong runs within 100 miles of the coast of Cochin China, where there are plenty of good harbours; the war-route would have to go *viâ* Labuan and the Palawan. Labuan in war-time would thus become of importance, but at present it has been utterly neglected, and has even been handed over to a chartered company; it possesses a fine harbour, inexhaustible mines of the best coals in the East, and has a fair climate; the Imperial Government should at once resume the control of the island, and give it a defence of the 4th class.

We now come to Hong Kong, the terminus of our chain of ports in the far East, and the site of our naval arsenal for the China station; it is also only 900 miles from Saigon, and it is therefore liable to a sudden raid, both by cruisers to bombard the town, and troops landed from a trooper, in a similar way to Singapore, so Hong Kong must have a defence of the 2nd class. The Navy is sincerely glad that Port Hamilton has been given up; it was a bad harbour, and would have been a constant source of anxiety to the Admiral by taking away a portion of his force to defend it. In the event of a war with Russia our base of operations against Vladivostock would be one of the numerous bays on the Siberian or Corean coasts.

3. *Indian Trade Route.*

The Indian trade route in war will coincide with the China route as far as Mauritius; thence it bifurcates to Bombay, Colombo, Madras, Calcutta, Rangoon.

The route between Mauritius and Bombay will be liable to attack from Diego Suarez, especially at the outbreak of war, and would have to be protected from Mauritius and Seychelles as bases. The naval coaling stations near, but not on, this route are Seychelles and Trincomalee.

As stated above, Seychelles is one of the bases to protect the Bombay trade, and should therefore have a defence of the 4th class. Trincomalee is a naval yard as well as a coaling station, and should receive a 3rd-class defence.

The terminal stations have now to be considered.

Colombo is a very important mercantile port and coaling depôt, though it would lose some of its importance if the Suez Canal were closed, it should therefore have a 3rd-class defence.

Madras would best be protected by torpedo-boats, as shore batteries would protect neither the town nor the shipping in the roads.

Calcutta, on the other hand, is easily defended, and should have one of the 3rd class.

Rangoon will require no defence.

4. *Australian Trade Route.*

The Australian route in war-time would coincide with the China route as far as the Cape, and this fact emphasizes the importance of Sierra Leone as a naval base; the greatest, almost the only danger, to these vital arteries of trade, after it leaves the Channel, will be on that portion from Madeira to the Equator, and Sierra Leone is the only port anywhere near where our men-of-war can coal, except a temporary coaling station at Cape Blanco, as has been suggested; of course, if we had St. Vincent or Teneriffe, Sierra Leone would lose its importance.

The Australian route after leaving the Cape is as follows:—

King George's Sound, Adelaide, Melbourne, Sydney, Brisbane, Perth, Hobart, Wellington.

The route from the Cape to Melbourne may be considered perfectly safe; that from Melbourne to Brisbane and to Wellington is threatened from Numea, New Caledonia, Brisbane being 840 miles and Wellington 1,300 miles distant, while the Melbourne-Wellington route is 1,100 miles, and the Sydney-Wellington only 900 miles from it in round numbers; both these routes have to be protected from Sydney and Wellington as bases.

Taking these circumstances into consideration, the following defences will have to be provided for these places:—

King George's Sound, as an important coaling station, 4th-class defence.

Adelaide, torpedo-boats only.

Melbourne, 3rd-class defence, is very easily defended.

Sydney, being an important naval arsenal, and being near Numea, will require a 2nd-class defence.

Brisbane is up a river, so that a 4th-class defence will be quite sufficient.

Wellington is out of the way, but being the capital of New Zealand, with a fine harbour, should have a 3rd-class defence.

Hobart, as the capital of Tasmania, a 4th-class defence.

There still remain the important coaling ports of Newcastle, New South Wales, and Westport, New Zealand, each of which should be protected by a 4th-class defence.

Torres Strait would not be used as a main line, but there would be a considerable local trade to China and India; Thursday Island, as a coaling station, should have a 4th-class defence.

The homeward trade route would go *viâ* the Straits of Magellan, and is quite safe.

4. *North American Trade Route.*

Little need be said about this route in the supposed state of war. There is no enemy's base anywhere near, and the steamers are generally well able to look after themselves; the route to New Orleans would touch at Bermuda or Nassau, New Providence.

The only ports on this route are Halifax, Bermuda, Nassau.

Now that the Canadian Pacific Railway is an alternative route to the East, and as Halifax is the terminus at this end, and has also a small naval yard, it should have a defence of the 2nd class.

Quebec, guarding the St. Lawrence and the gate of Canada, one of the 2nd class.

Bermuda, as an important naval arsenal, should have also a 2nd-class defence.

Nassau does not require any defence.

5. *West Indian Trade Route.*

This route in war would take the same way as in peace, namely, to St. Thomas, one of the Virgin Islands, and thence to the other islands, Jamaica, Barbados, &c.

Port Royal, Jamaica, and Port Castries, St. Lucia, are the only naval ports near this route. Antigua, however, would have been a better place to have chosen than St. Lucia as a fortified coaling station for the following reasons:—

1. It is much nearer the trade route.

2. It is much healthier.

3. It possesses a land-locked harbour, which, though small, is quite large enough for any ship that may want to use it, and which is easily defended.

As it is doubtful whether white troops could garrison St. Lucia for any time, I shall substitute Antigua for it.

In dealing with the West Indies, we must look forward to what will happen in ten years' time, when the Nicaragua Canal will be opened; their importance then will be vastly increased. The trade route will then go through the Mona Passage, and Jamaica will be the coaling station before ships pass through the canal.

The enemy's ports near this trade route are Guadaloupe and Martinique. Considering the proximity of these two islands, with their large garrisons and the probability of a raid on Antigua by a military force in a troop-ship, Antigua should have a 3rd-class defence.

Port Royal is easily defended, and considering its future importance, although it is so far from Martinique, over 1,500 miles, that it is not likely to be raided like Antigua, it should have a 2nd-class defence.

6. *South American Trade Route.*

This route would be the same in war as in peace, namely, St. Vincent, Rio de Janeiro, River Plate, Straits of Magellan, and up the west coast of South and North America.

The only foreign enemy's port near this route is Goree, and it will be a safe one after passing the Equator, except perhaps a stray cruiser in the Straits of Magellan.

We have no ports for coaling our men-of-war on this route till it reaches Vancouver Island; the Falkland Islands, however, are near it before it enters the Straits, and hence the importance of these islands.

It may here be asked, How could an enemy's cruiser remain in the Straits of Magellan with their nearest base at Goree?

The reply is, that in uncivilized countries like Tierra del Fuego, and also the north side of the Straits with its numerous harbours, meeting places between the cruisers and colliers will be arranged beforehand where there is no local authority to stop them; of course this would be found out in time by our cruisers, but it would be very effective against our commerce on the outbreak of war, which, indeed, is the most dangerous time of all.

The same thing would happen also in the East Indies, where there are many places in which the local authorities could not enforce International Law, even if they had the will, for this essay is founded on the law that coal is contraband of war, and that neutrals will enforce this law, the only exception being that a belligerent cruiser may take in enough coal to reach the nearest port once, and once only, during the war; if this law is not enforced, then any coaling stations are useless, as our cruisers could coal much more safely in neutral ports.

The Falkland Islands are 350 miles from the trade route, and 400 miles from the entrance of the Straits of Magellan. The route from the Straits of Magellan as far as Vancouver Island runs along neutral territory all the way, and is quite safe.

7. *Panama-Australian Trade Route.*

Here we have a long and exposed ocean passage, which will become of vast importance when the Nicaragua Canal is opened.

Our ports on this route are Fiji and Sydney. Fiji, being about 6,000 miles from Panama, is too far for an ordinary steamer to go without coaling. Fortunately we have taken possession of the Caroline Islands, in lat. 12° S. and long. 150° W., all the others in the neighbourhood belonging to the French. The Caroline Islands are about 4,000 miles from Panama or the entrance of the Nicaragua Canal, and 2,000 from Fiji, which are convenient distances; so it is to be hoped that there is a good harbour, as it has been observed all the surrounding islands are in the hands of France. Tahiti, the headquarters of the French Pacific squadron, is 460 miles from the Caroline Islands, and the Marquesas are directly on the line of the main route.

Between Fiji and Sydney, 1,780 miles, the route would be exposed on the flank to New Caledonia, which is only 180 miles distant from it.

Taking into consideration the vast importance of the Caroline and Fiji Islands when the Nicaragua Canal is opened, and the very exposed condition of the great trade routes through it to Australia, since every island in the Pacific would be a convenient place for an enemy's cruiser to coal from a collier sent out there, Fiji should have a 2nd-class and the Caroline Islands a 3rd-class defence.

8. *Vancouver-Australia Trade Route.*

The ports on this route are Vancouver Town, Esquimalt, Honolulu, and Fiji, and it may be considered a safe one as far as Fiji, there being no port of the enemy anywhere near it.

Vancouver Town, as the terminus of the Pacific Railway, and Esquimalt, as a naval arsenal, are both exposed to a raid from Vladivostock or rather Petropaulovski, distant 3,000 miles, or a week's steaming for one of the new volunteer fleet.

Esquimalt should therefore have a 2nd-class, and Vancouver Town a 3rd-class defence; while the coal mines at Nanaimo require a 4th-class defence.

9. *Vancouver-Yokohama Trade Route.*

We now come to the last important main trade route, that across the Pacific from Vancouver to Yokohama. This starts from a well-defended port and ends at a neutral one, and is not threatened by any port of the enemy on its flank, so that it can well look after itself; any cruisers protecting the Japan end would obtain their coal at the port or harbour seized by our China Fleet on the coast of Russian Tartary or Corea. The local routes between Hong Kong and Shanghai and Yokohama require little notice; they have numerous neutral ports under their lee, and are comparatively safe.

To conclude the first part of our subject, namely, "To what extent, if any, should our naval force be supplemented by fixed defences at home and abroad," it has been shown that as long as we have command of the sea, no enemy would risk the loss of a large portion of his fleet by attacking any of our ports, that they would possibly risk a small force of about one-tenth of their battle-ships with two transports of troops to destroy one of our great arsenals, if they saw the chance, but that probably our other ports would only be exposed to raids by from one to four cruisers, and perhaps one transport, according to their wealth and importance and their nearness to the enemy's base of operations.

The shipping in our ports will, however, always be subject to attack from the enemy's torpedo-boats if they are not adequately protected.

It may here be remarked that no supposed International Law

would for a moment prevent an enemy from requisitioning or bombarding what is called an "undefended port" if he found it pay him to do so; this principle has been distinctly taken up by the school of the late Admiral Aube, and has never been denied; the only thing to be said is that two can play at that game.

All our fixed defences have therefore been divided into four classes, so as to be able to treat them in a general manner, and all our principal commercial ports and harbours have been placed in one of these classes, it being assumed that they might have to repel the determined attack of from one to four cruisers, and also assumed that a certain number of guns in batteries on shore are more powerful than an equal number afloat. Our submarine telegraph cables must most certainly be considered in conjunction with our fixed defences; their importance is incalculable, especially at the commencement of war; the want of them, and, still more, false news sent by them, for instance, from Saigon to Hong Kong or Singapore, would cause immense damage, far exceeding the cost of the cables.

The following sea cables are strongly urged as necessary, viz.:—

1. Sierra Leone, Ascension, St. Helena.
2. Singapore, Labuan, Manila; the latter place is already connected to Hong Kong.
3. Auckland, Fiji Islands.
4. Zanzibar, Seychelles, Mauritius.
5. Monte Video, Falkland Islands.

Also the following land lines, viz.:—

1. Bhamo, Yunan.
2. Mergui, Malacca, Singapore.

These two lines would make Hong Kong and Singapore independent of the cables.

The protection of our commerce on the outbreak of war can only be secured by compelling it to follow certain fixed routes; these should be laid down beforehand and called A, B, C, &c., and all ship-owners and masters should be acquainted with these routes.

On the outbreak of war, all steamers would proceed by the route telegraphed out confidentially from the Admiralty, and the route changed by telegraph whenever necessary; for instance, one route might pass 50 miles to the eastward of St. Helena, another, 100 miles, and so on; by this means our cruisers would know where to find our commerce, but the enemy would not.

All sailing ships would be stopped and laid up at the same time.

If these precautions are adopted, our commerce ought not to suffer very severely, and there ought to be no panic.

In an essay by the author, sent to compete for the medal of the Royal United Service Institution some years ago, it was strongly urged that the Government should pay all extra war insurance premiums; this would prevent our trade being transferred to another flag, this meaning the total loss of our carrying trade and absolute ruin to the country.

If our maritime supremacy is assured, and if the above scheme of fixed defences to supplement it is carried out, our loss of commerce

should not exceed 10 per cent. per annum, most of it falling on the first year; since a modern merchant steamer is far better able to take care of itself than the old sailing vessel. An enemy's cruiser should be made out at a distance of 12 miles, and say she has the advantage of $1\frac{1}{2}$ knots extra speed, she would take eight hours to come up with the merchant steamer, or, in other words, any vessel sighting an enemy's cruiser after noon, has a very good chance of escape at night, even if none of our own cruisers should turn up.

There is one point of International Law that ought to be decided at once—Is a defenceless merchant steamer liable to be torpedoed and sent to the bottom while trying to escape, or is she not? This question is of great interest to our civil population.

The proposed scheme of fixed defences has been founded on the following principles :—

1. That our naval supremacy is unquestioned.
2. That our fleets are off the enemy's ports and guarding the trade routes.
3. That, however well the enemy is watched, a few cruisers may escape and make a sudden raid.
4. That the action of these cruisers is strictly limited by their means of obtaining coal.
5. That, if there are no fixed defences, a portion of our fleet will have to be detached to defend the ports locally.

Having considered to what extent our naval force should be supplemented by fixed defences at home and abroad, we now come to the second part of our subject, viz., "To whom should they be confided?"

Here we are encountered by two totally different schools of thought and opinion, the first holding that the fixed defences should be entrusted to the Navy, the second that they should remain in charge of the Army.

The arguments for the former may be briefly stated as follows :—

1. Most foreign Powers have placed their ports under naval control.
2. Most of our ports abroad being simply coaling stations and bases for the Navy, they should be, therefore, under the control of the naval Commander-in-Chief of the station.
3. To avoid dual control and different objectives of defence.

It is generally acknowledged that these principles only apply to certain ports (see Table D), and exclude all the ports at home, in India, in Canada, and in Australia, leaving only those shown in the list as Imperial Ports to be dealt with.

Others, again, say that the theory is correct, and that, if we began again, it would be the right thing to do, but that it now would be quite a revolution to effect a change.

With reference to the first argument, our necessities are totally different from all foreign Powers.

Granted our naval supremacy, our naval policy is offensive, and the station of our fleets is off the coasts of the enemy, remaining only in our own ports to coal, to repair, or to await an opportunity to

pursue the enemy, and on no account should they be tied up there ; our adversary's navy, on the other hand, would act on the defensive, and would remain in their own ports for indefinite periods. Such being the case, it is plainly manifest that a system of defence which would be suitable to a weaker naval Power would not necessarily be so to the stronger.

Where the fleet have no intention of leaving the shelter of the port, it may be desirable to place the whole control under naval authority.

With reference to the second argument, our ports abroad are commercial centres and coaling places for our mercantile marine, as well as for the Navy, the interest of the Navy being solely confined to the safety of the dockyards and coal stores, whereas a military base is part and parcel of the military operations. If the different ports were under the control of the naval Commander-in-Chief, it would tie his hands considerably, and add tremendously to his responsibilities, without any commensurate advantage ; instead of devoting all his energies to attacking the enemy's fleets wherever found, he would constantly have to keep his attention on the local defences of the different ports in his charge.

With reference to the third argument, dual control of the land and sea forces would certainly be abolished by having the ports under naval Officers, who would be under the naval Commander-in-Chief ; the Officer in charge of the defence of the port would probably, however, have a different objective : his first idea being local defence only ; that of the Admiral, the pursuit of the enemy and defence of commerce on the high seas.

If the Imperial ports are confided to the Navy, they would have to be manned either by marines or seamen.

Now the Marines are perfectly competent to undertake any duty they are called on to perform, and would form most efficient garrisons ; but in doing this would they not cease to be marines, and become merely a land force under Admiralty control, like the French marines ?

At present the force is 14,000 strong, of whom 7,000 are on board ship, or, excluding mere harbour ships, there are about 5,000 men in sea-going ships, or over one-third of the whole force ; so that every man of twelve years' service will have been four years in a sea-going ship ; and it is just this period afloat which gives the corps its peculiar and valuable qualities.

The garrisons required for the Imperial ports only, according to Table D, is a total of 22,000 men, which is a very moderate estimate ; one-half more will at least be required for reliefs, or 11,000 men : total 33,000 ; adding 14,000, the present number, we get a grand total of 47,000 men. Supposing every man took his turn, he would only have a little more than one year's service in a sea-going ship, which is manifestly not enough, and the tendency would be for the corps to become a land force only.

Again, a certain proportion of many garrisons should be non-European, who could stand the climate better than Europeans, and who, of course, could never be marines.

Trincomalee, Colombo, Mauritius, Penang, Singapore, Hong Kong, and Fiji should have half their garrisons composed of Sikhs, Afghans, &c., and Sierra Leone, Antigua, and Jamaica half of Africans; the West Indian troops should be withdrawn from Africa and replaced by Houssas or Zulus. It seems strange that we have never taken advantage of the splendid fighting qualities of the great Zulu nation.

In order not to break up regiments unnecessarily, and to take advantage of the adaptability of the Marine Corps to provide small detachments, some of the smaller stations might be manned by marines; for instance, Ascension, St. Helena, Seychelles, Chagos Islands, Labuan, Falklands, and Caroline Islands, would want 1,400 men altogether; and, adding one-half for reliefs, we have a total force of about 2,000 men, which, if added to the Marine Corps, would not alter its constitution.

These islands being garrisoned by marines, would naturally fall under naval control, since they are not of sufficient importance to tie the hands of the Admiral, or to add materially to his responsibilities.

The objections already stated against the use of marines as garrisons for our Imperial coaling stations hold with much greater force against the employment of naval Officers and seamen on such duty, and there are also others in addition.

The present number of bluejackets or *bonâ fide* seamen is about 20,000, and, adding the 33,000 required for the coaling stations, would make a total of 53,000; this would give the seamen only about $\frac{1}{4}$ of their service in a sea-going ship, instead of $\frac{3}{4}$ as at present.

It has been shown that many of our important coaling stations are always open to a sudden land attack owing to the proximity of an enemy's base holding large forces; it is manifest that such operations on land should be entrusted to military Officers, and not to naval Officers.

The tendency of the present day in all modern sciences is towards dividing them into specialities, from the impossibility of any one man making himself a thorough master of the whole of them; how, then, can it be proposed that a naval Officer should undertake the study of military science, itself the work of a lifetime, in addition to making himself proficient in all his many other duties?

Is the Admiral in command of the Fleet to work out all the plans for the defence against a land attack on the different places in his charge, and is he to take personal command of the operations, or is he to leave these matters in the hands of the Officer Commanding? If he does the latter, he ought to have nothing to do with the defence of the place at all, and if he does the former, he will probably be neglecting his purely naval duties. No, he should not have to do either one or the other, but have his mind free to devote itself to naval problems; as the motto at the head of this paper says, "Let the cobbler stick to his last," and every man attend to his own business; naval Officers and seamen should not be required to take part in land operations against a modern civilized army until the Fleet is driven off the sea, or has won such a complete victory that

the services of the seamen are no longer required afloat. Seamen can take part with great effect in land operations against undisciplined or savage nations; but on those occasions their services are not required on board, and no great military training is necessary for that class of warfare.

The conclusion come to, therefore, is this, viz.: That our fixed defences at home and abroad should be confided to the military, with the exception of some small minor stations which should be manned by marines, to avoid the evil of breaking up a whole regiment into small detachments.

There is one part, however, of the fixed defences in which the principle expressed in our motto is broken with a vengeance, and in a most extraordinary manner, and that is the work of planning, laying down, and manipulating the different systems of submarine mines.

If any subject was a purely naval subject in the world, one would think submarine mining was one, since even balloons are now included in the naval *répertoire*.

1. The whole paraphernalia of cables, mines, buoys, boats, &c., are naval.

2. The sphere of action of the mines is in the water.

3. They are laid down and taken up by boatmen in boats.

4. Perfect familiarity with tides, winds, and currents is necessary.

5. Knowledge is required of the construction of ships and of their movements in narrow waters.

6. The object of submarine mines is to destroy ships of the enemy, but not those of a friend; the operator should therefore know one ship from another.

7. Close acquaintance with the art of navigation in pilotage waters is absolutely indispensable, so as not to obstruct the free movement of trade, especially in our case, where our sea commerce is our very life-blood, and we cannot even afford to delay or annoy it, much less close any port altogether, as some foreign Powers might do without harm to themselves.

Taking all these things into consideration, would it be believed by the public in general that this important and exclusively naval work is in the hands of soldiers and landmen?

No wonder that in a recent report it was stated that if the proposed systems of submarine mines were laid down at our ports, the free navigation of them would be seriously impeded.

It is not implied that the Royal Engineers do not do the work well according to their lights, but it is affirmed that the Navy would do it better, in the same way as operations on land would be better performed by soldiers, although sailors would do their best.

It has been stated as an argument that the system of submarine mines ought to be laid down and controlled by those who plan and work the forts, but this is simply putting the cart before the horse, for what is the object of our harbours both at home and abroad? Is it not that our ships may go in and come out freely? It is

certainly not that they should be blocked altogether; on the chance of an enemy's cruiser coming in and getting blown up; sooner than this, no mines should be laid down at all. Let the system of mines be planned and laid down by the Navy with due regard to navigation, and then the Engineers can build the forts necessary to defend them; these, in fact, will be simply small batteries of quick-firing guns, as the mine-field would only be attacked by boats or small vessels.

Therefore it is most strongly urged that the whole of our submarine mining defence, including the quick-firing guns and electric search lights necessary for their protection, should be confided to the Navy, and to the Navy alone, both at home and abroad, and thus abolish the anomaly of a purely naval weapon of defence being worked by landmen.

What, then, is recommended so as to combine our sea and land forces to the greatest effect? First, that the money spent on our fixed defences should bear a proper proportion to that spent on our naval force; and, secondly, that there should be unity of control at each of these fixed defences.

The only way to secure that the total amount of money for the defence of the Empire should be properly expended is to place the whole of our land and sea forces under one powerful Minister of War, who, if he is not Prime Minister, should be next him in political influence.

This War Minister should be advised and assisted by two high Officers, one a General in command of the Army, and the other an Admiral in command of the Navy; these Officers to be members of the Privy Council.

A General Staff for the Army, and one for the Navy, should be created to advise these Officers in command on all subjects relating to war, the members of these two Staffs to meet together once a week for mutual consultation.

The Minister of War would not concern himself with the details of his department, which would be left to his two assistants, but only with the general strategy required for the defence of the Empire, and the strength and disposition of its forces; he would keep in his own hands the movements of fleets and armies, and also the appointments of all Flag and General Officers.

By our Parliamentary system of government, it is necessary that the head of a great spending department should be a politician, but, as a rule, he knows nothing of the details of either the Army or Navy, and he should not be required to waste his time in trying to learn them, but they should be left to his professional advisers; the general strategy of war can, however, be firmly grasped by civilians of genius such as the elder Pitt, and what grander sphere can there be for an ambitious Minister than to aspire to the control of all the forces of this vast Empire, and rival the fame of that mighty statesman?

To obtain the second object, viz., unity of control at the fixed defences, a naval Officer should be attached to the Staff of the General Officer Commanding at every port both at home and abroad.

At home, this Officer in the fortresses would be of the rank of

Captain, R.N.; in all other parts of the United Kingdom he would be the Inspecting Officer of Coastguard.

Abroad, there would be Captains, R.N., for the fortresses, Commanders for defences of the 2nd class, and Lieutenants for those of the 3rd and 4th classes.

This naval Officer to have entire command and control and charge of all the purely maritime portions of the defences, manned and worked by seamen:—

1. Torpedo-boats.
2. Armed local steamers.
3. Brennan and Whitehead torpedoes.
4. Submarine mines.
5. Quick-firing 6-pr. batteries to defend ditto.
6. Electric search lights to defend ditto.
7. Naval Reserve.
8. Naval Volunteers.

During the time he is on the General's Staff, he is to be under the command of that Officer.

The general conclusions come to on the subject of this essay are as follows:—

1. That to the Navy should be entrusted the duty of sweeping the high seas and of keeping them clear of the enemy's cruisers.

2. That, after our maritime supremacy has been assured by building a sufficient number of ships, our naval force should be supplanted by certain fixed defences, raised to meet a definite purpose at our different ports at home and abroad; this purpose being to resist a raid or attack by one or more cruisers for a few days, and to offer a safe refuge for our war-ships and mercantile marine while coaling, loading or unloading, or under repair.

3. That these fixed defences are of little use, since they could not keep the entrance of the port clear, or prevent the attack of torpedo-boats, without a floating defence consisting of torpedo-boats and armed local steamers acting as guard-boats.

4. That these fixed defences should be under military control, but that all the purely naval or maritime portion of the defences should be manned and worked by seamen under a naval Officer attached to the Staff of the General Officer in command.

5. To avoid, however, breaking up regiments into small detachments unnecessarily, certain small coaling stations abroad should be manned by marines and seamen and placed under naval control.

6. That the only way that our naval and military forces can be kept in their proper proportion, and used with the greatest effect, is to place them both under one Minister.

TABLE A.

Nation.	Armoured.				Unarmoured.				Gun-vessels.
	Battle-ships.	Coast service.	Cruisers.	Total.	Cruisers, 1st class.	Cruisers, 2nd class.	Cruisers, 3rd class.	Total.	
<i>Built 1891.</i>									
England	32	15	20	67	0	24	44	68	16
France.....	13	5	5	23	5	2	11	18	8
Russia.....	5	9	8	22	2	3	15	20	3
<i>Building 1891.</i>									
England	10	0	0	10	11	26	0	37	17
France.....	8	4	5	17	0	6	4	10	4
Russia.....	7	0	2	9	0	0	0	0	5
<i>Total, 1894.</i>									
England	42	15	20	77	11	50	44	105	33
France.....	21	9	10	40	5	8	15	28	12
Russia.....	12	9	10	31	2	3	15	20	8
France and } .. Russia }	33	18	20	71	7	11	30	48	20

Notes on Table A.

1. All wooden or composite ships and all armour-plated ships under 2,000 tons are omitted.
2. Third class battle-ships are classed as armoured cruisers.
3. H.M.S. "Sultan" and the Russian Volunteer Fleet, built and building, are not included.
4. "Rupert," "Hotspur," "Belleisle," and "Orion" are classed as coast service.
5. Fast ships of the "Rattlesnake" type are classed as gun-vessels; all other small craft are omitted.

TABLE B (1).—*At Home.*

Place.	Class.	Torpedo-boats.	Garrison.	Total.
Thames	1	6	3,000	27,000
Medway	1	6	3,000	
Dover	1	6	3,000	
Portsmouth	1	6	6,000	
Portland	1	6	3,000	
Plymouth	1	6	6,000	
Pembroke	1	6	3,000	
Mersey	2	3	1,500	12,000
Clyde	2	3	1,500	
Tyne	2	3	1,500	
Wear	2	3	1,500	
Tees	2	3	1,500	
Humber	2	3	1,500	
Belfast	2	3	1,500	
Queenstown	2	3	1,500	
Total	66	..	39,000

TABLE B (2).—*At Home.*

Place.	Class.	Torpedo-boats.	Garrison.	Total.
Bristol	3	2	400	2,800
Cardiff	3	2	400	
Aberdeen	3	2	400	
Dundee	3	2	400	
Forth	3	2	400	
Harwich	3	2	400	
Kingstown	3	2	400	
Newhaven	4	1	200	800
Dartmouth	4	1	200	
Falmouth	4	1	200	
Waterford	4	1	200	
		18		3,600
		66		39,000
Total at home	84	..	42,600

TABLE C.—*Class of Defences.**First Class or Fortress.*

Twenty 10-inch guns or their equivalent.
 Eighteen 6-pounder quick firers.
 Four electric search-lights.
 Six torpedo-boats.
 Garrison, 3,000 men.

Second Class.

Eighteen 6-inch guns or their equivalent.
 Twelve 6-pounder quick firers.
 Three electric search-lights.
 Three torpedo-boats.
 Garrison, 1,500 men.

Third Class.

Ten 6-inch guns or their equivalent.
 Eight 6-pounder quick firers.
 Two electric search-lights.
 Two torpedo-boats.
 Garrison, 400 men.

Fourth Class.

Six 6-inch guns or their equivalent.
 Six 6-pounder quick firers.
 Two electric search-lights.
 One torpedo-boat.
 Garrison, 200 men.

Note.—1. These classes of defence are calculated for ports or harbours with only one entrance; for all those with two entrances, double the armament will be required, and an addition to the garrison of one-third of its strength.

2. The garrisons do not include the seamen required to man the torpedo-boats, work the submarine mines, electric lights, &c.

TABLE D (1).—*Abroad.**Imperial Garrisons.*

Place.	Class.	Torpedo-boats.	Garrison.	Total.
Malta	1	6	6,000	
Gibraltar	1	6	3,000	
Sierra Leone	2	3	1,500	
Cape Town	2	3	1,500	
Simon's Bay.....	2	3	1,500	
Mauritius.....	2	3	1,500	
Colombo.....	3	2	400	
Trincomalee.....	3	2	400	
Penang.....	4	1	200	
Singapore.....	2	3	1,500	
Hong Kong	2	3	1,500	
Bermuda	2	3	1,500	
Antigua	3	2	400	
Jamaica	2	3	1,500	22,400

TABLE D (2).—*Abroad.*

Place.	Class.	Torpedo-boats.	Garrison.	Total.
<i>Marine Garrisons.</i>				
Ascension	4	1	200	
St. Helena	4	1	200	
Seychelles.....	4	1	200	
Chagos	4	1	200	
Labuan	4	1	200	
Falklands.....	4	1	200	
Carolines	3	2	400	1,600

Indian Garrisons.

Aden	2	3	1,500	
Perim	4	1	200	
Kurachi.....	3	2	400	
Bombay	2	3	1,500	
Madras	2	3	1,500	
Calcutta	3	2	400	5,500

TABLE D (3).—*Abroad.*

Place.	Class.	Torpedo-boats.	Garrison.	Total.
<i>Australian Garrisons.</i>				
St. George's Sound	4	1	200	
Adelaide	3	2	400	
Melbourne	3	2	400	
Sydney	2	3	1,500	
Newcastle	4	1	200	
Brisbane	4	1	200	
Thursday Island	4	1	200	
Wellington	3	2	400	
Westport	4	1	200	3,700
<i>Canadian Garrisons.</i>				
Halifax	2	3	1,500	
Quebec	2	3	1,500	
Vancouver Town	3	2	400	
Esquimalt	2	3	1,500	
Nanaimo.....	4	1	200	5,100
Total abroad	91	..	38,300
Grand total	175	..	80,900

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NAVAL ESSAY.

(HONOURABLY MENTIONED.)

MARITIME SUPREMACY BEING ESSENTIAL FOR THE
GENERAL PROTECTION OF THE BRITISH EMPIRE
AND ITS COMMERCE, TO WHAT EXTENT, IF ANY,
SHOULD OUR NAVAL FORCE BE SUPPLEMENTED
BY FIXED DEFENCES AT HOME AND ABROAD, AND
TO WHOM SHOULD THEY BE CONFIDED?

By Lieutenant EDMUND HYDE SMITH, R.N.

“England by her Navy must stand or fall.”

Introduction.

WITHIN the last few years no question has been so warmly discussed as the advisability of supplementing the defence of the British Empire, left in days of old to the Fleet and a field army, with passive or fixed defences, requiring, in most cases, permanent garrisons.

Two extreme views have been taken. In discussion, both sides have occasionally overstated their case. Arguments have been used, on the one hand, which have for their premiss the total defeat of our fleet, or fleets, without their having inflicted enough damage on the enemy to deter him from at once undertaking further operations without refitting.

The other view assumes that, on the outbreak of war, the Fleet have, or should have, a sufficient superiority to ensure the command of the sea, and argues that, as every individual fleet, squadron, or ship of the enemy will be well looked after, there will remain no necessity for fixed defences.

I believe that the solution of the question is to be found in a happy mean, in which the Fleet and fortifications form part of one harmonious scheme of defence.

No proper conclusions as to the necessity for, or amount of, fixed defences for our maritime ports and coasts can possibly be arrived at without considering to what attack they may be subjected. To arrive at this conclusion it is necessary to carefully consider the relations between the operations of the Fleet and territorial attacks by the enemy. In doing so, it must be remembered that maritime

supremacy is assumed, and that by maritime supremacy is meant, in our case, an ability to afford a good share of protection to our trade, and a sufficient fleet to meet the enemy with equal or superior force, as much for the protection of trade as for the prevention of territorial attacks under cover of our ships. I shall accordingly divide my essay into four parts, viz.:—

i. The amount of protection afforded to ports and seaboard by the operations of our Fleet.

ii. Cases in which such defence would become inoperative, and the nature of attack to which our territories could be subjected.

iii. Nature of protection proposed to be afforded to different ports by passive defences.

iv. Control and personnel of coast defence.

PART I.—*Amount of Protection afforded to Ports and Seaboard by the Operations of the Fleet.*

Irrespective of the defence of territory, let us first enquire what would be the duties of the Fleet in the event of war with a great maritime Power or Powers.

Duties of the Fleet.—These I should enumerate as follows:—

i. Masking the enemy's fleets by superior force. This necessitates having large numbers of look-out ships, in addition to a superior fighting force.

ii. Keeping the fleets' lines of communication open with the base or bases. (Necessary to ensure the supply of coal, provisions, and munitions of war being not interfered with by escaped raiders.) For this work, fast cruisers would be necessary.

iii. Patrolling the trade routes:—

(a.) On the ocean highways and where routes converge on the high seas.

(b.) In the vicinity of the commercial ports, to keep them open.

Of these duties—

(a.) Must be performed by fast cruisers;

(b.) Can be performed by vessels of less speed and radius of action than (a), provided that they are sufficiently well armed and protected.

iv. If it is conceded that the Fleet's duties do embrace the protection of territory, including the defence of the United Kingdom against invasion, then a reserve or flanking fleet becomes necessary. Such fleet may be much smaller than the enemy's main fleet, masked by ours. Its duties would be to threaten and, if necessary, engage the enemy, should our masking fleet suffer a reverse. They would, however, prefer to avoid an engagement until reinforcements from the defeated fleet placed them in a position of superiority.

Frequently these duties overlap one another. Sometimes a ship might be efficiently performing several of them. Thus, a vessel running between a fleet off Brest and Plymouth would be patrolling

the trade route from Ushant to Plymouth, keeping open the communications of the fleet, and, by making the Lizard, assisting to keep Falmouth open. She would also, whilst in England, be ready to reinforce the Reserve Fleet at short notice.

Sometimes, on the other hand, a ship would have to be confined to one particular service, and she could not be depended on for other purposes.

Let us now consider how far these operations will, if efficiently performed, affect the question of fixed defence.

And first let us consider (i), viz., the masking or holding in check the enemy's fleet by superior force.

With an enemy's fleet free, the first operation of our own should be to gain touch of him. This is as much a principle of naval as of military warfare. Fortifications could not, in this case, free fleets for offensive operations, as is sometimes maintained. If the enemy's fleet attempted to attack our coast, the duty of our fleet would clearly be to attack him. It is a strange misconception of the operations of war which supposes an enemy's ships steaming round our coasts, bombarding our towns, whilst our own ships are performing somewhat similar operations on theirs.

The place for our ships is where those of the enemy are. If we, being in a proper position of supremacy, make proper disposition of our force, we should have touch of the enemy's ships on the first outbreak of war. If, *then*, no ships evade ours, his only means of undertaking territorial attack lie in inflicting a crushing defeat on our Fleet, and by having afterwards a sufficient force in a fit condition to accomplish his particular purpose. As our Fleet is, by hypothesis, superior, all human probabilities are against his success.

Even had he the good fortune to defeat us, the condition of his own fleet would hardly be one in which to conduct any further operations without refitting. Our Fleet would have at least equal facilities for doing the same.

This argument expressly leaves out of consideration the operations of a Reserve Fleet, stationed always in the Channel. If such a fleet existed, an enemy would have to deal with them before he could go further. They would be reinforced at once by such of our ships of the main fleet as were uninjured in the defeat, not to mention the cruisers, coast-defence ships, and torpedo-boats, which would, on such an emergency, leave their special stations round the coast of the United Kingdom.

Let us imagine our fleets have sustained a crushing defeat, and that they are masked in one of our arsenals by a superior force of the enemy. We will suppose that he then has a force free sufficient for further operations. Granted that a small defence of the port would prevent an enemy from entering the harbour, he would, however, be in a position, if he chose, to undertake a siege by land and sea. As he would have, in that case, our land forces on his rear, he would hardly waste time over such an attempt, which, if it succeeded, would not pay him so well as an attempt to invade the country, combined with the interruption of our supply of food and raw materials.

It may be therefore, I think, assumed that in such a case an enemy would, if his superiority was well established, attempt to invade the country and interrupt our trade; if he was afraid of having his retreat by sea cut off he would attempt the latter only, and this fortifications would be powerless to prevent. I therefore think that to fortify forts against a *siege* is a distinct waste of money and men.

Against an enemy being in this position, I believe a reserve or flanking to be the best safeguard. Whilst being better than any possible fortifications, such a fleet has the additional advantage of protecting trade and communications, which functions cannot be claimed for fixed defences. It is sometimes argued that if inferior in force to the enemy it would be no defence. An inferior force is, however, a defence until defeated and held in check by the enemy, and in our case this fleet does not stand alone; by our hypothesis a fleet originally superior to the enemy has been defeated, and is refitting. The Reserve Fleet is therefore an inferior force expecting at any time reinforcements which will make it greatly superior to the enemy. The latter, uncertain where the reinforced fleet might be expected to attack him in superior force, would not risk being caught in any territorial enterprise, the most dangerous position in which to be caught. Nelson and the French fleet at Aboukir afford a sufficient instance; Napoleon's genius could not extricate his army with supplies from, and retreat to, the sea cut off. An enemy's best plan would obviously be to catch the Reserve Fleet with his superior force and utterly crush it. This the Reserve Fleet could easily avoid, even to the extent of retiring into the port in which the ships refitting were lying. A very moderate defence (considered subsequently) would be sufficient to prevent the enemy from entering. Our Commander would take care not to allow himself to be blockaded within, except by the bulk of the enemy's force, without which the enemy (on the hypothesis of his original comparative strength) could not maintain his position. And if he there maintained his position, his *war-ships* would not be free to undertake or cover further attack. If he left, the Reserve Fleet would also be free, and in the position previously dealt with.

This, I think, covers the most pessimistic view which it is possible to take. It is highly improbable that a superior fleet would, in the first instance, suffer such a grievous defeat as to render such events possible. Under ordinary circumstances, should our main fleet meet with reverses, the enemy himself would be considerably damaged. The Reserve Fleet would, by reinforcing, be a complete answer to any probable attack.

It may be conceded that London is particularly open, being close to the south and east coasts, where there are many places suitable for the disembarkation of troops.

Transports must, however, have war-ships to cover them. A few torpedo-boats, covered by two or three fast cruisers, would otherwise settle their fate.

The possibility of an enemy being able to do this has been already discussed.

As a substitute for the Reserve Fleet proposed to prevent this, there are those who advocate a very complete system of fixed defences for, at any rate, our southern and eastern coasts.

They say that *all* estuaries, creeks, rivers, ports, or places suitable for a landing should have fixed defences to assist the troops in preventing it. And the necessity is claimed, whether the port is or is not of commercial or naval importance.

All these positions would have to be fortified against, and fit to engage, an enemy's war-ships. Infantry and field artillery could not remain in permanent field-works in the face of such ships' fire.

Thus, wherever such positions were made for a resistance on the shore, heavy guns would have to be mounted sufficient to resist an attack made by a force which it would be unsafe to state at less than four ironclads.

For miles along the south coast alone, there are open beaches suitable for the disembarkation of troops, on a broad front, on almost any day in summer. To be logical all these must be fortified. It is no use fortifying this place or that place as against invasion. No sane enemy would metaphorically knock his head against a stone wall. If he could find one, he would disembark in an unfortified position. The claim practically amounts to a cordon of forts on a large portion of the south and east coasts. Our coast line will then be our frontier. We should on this plan lose no time, but proceed to fortify positions to repel an army advancing on London; we should adopt wholly the methods of Continental Powers, ignoring the fact that our position as a nation is totally different from theirs, and may require a different system of defence.

Far better will it be for us to trust to our Fleet as our first line, as in former days.

First let us bring it up to the strength necessary to perform its duties, including the provision of an adequate reserve squadron. Then, as a second line, organize the troops we have, so that they may have some chance against the well-trained, and probably picked, men that would (if a landing were effected at all) be disembarked on our shores.

At present, while the talk is of fortifications, we have only 85,000 Regulars in Great Britain, of whom at least 20,000 are recruits. We are quite priding ourselves on being able to place one whole army corps, some 32,000 men, in the field. Let us give the Militia and Volunteers artillery, transport, and commissariat. Out of the nominal 350,000 surely 150,000 might be placed in a fit condition to take the field. With the aid of 50,000 Regulars, such a force should be able to deal with any invaders of our shores, who could hardly number over 100,000 men, and could not be well supplied with either artillery or cavalry.

If this system be followed, we shall have *one complete* system of defence. If it is not, we shall have a fleet insufficient for any purpose, and fortifications which will neither be sufficient in themselves nor have proper garrisons. Our resources will be frittered away on two

incomplete systems, neither of which will, in time of war, render the other any support.

It has been said that the Navy ask for an impossible superiority; that we ask for a superiority of our fleets over the French *after* Trafalgar. What we really wish is that we may be in the same relative position as we held when war broke out in 1803, allowing for the difference in modern ships, which has substituted certainty of movement for uncertainty.¹

If this system be followed I come to my first conclusion from the preceding arguments:—

i. That even if the main fleet sustain a defeat, the state of the enemy will not be such as to undertake any organized territorial attack, in the face of a reserve or flanking fleet, and that consequently fortifications constructed to resist such an attack are unnecessary.

We now come to that part of the Fleet's duties which prevent an enemy undertaking any operation without first fighting an action. This may be termed the policy of evasion, and it may be remarked that in all naval history there is no case in which disaster has not overtaken those attempting it.

The French are the only nation sufficiently near to invade us in this manner.

The covering war-ships, without which the attempt could not be made,² must escape either from Brest or Cherbourg, or both.

If the blockading squadrons were properly constituted, they should know what force had eluded them within twelve hours.

The 1888 manœuvres are quoted against this view, but Admiral Baird's squadron was certainly not properly constituted for blockading. He had nothing like a sufficient number of fast small ships for in-shore work, and no use was made of mechanical mines. On the escape of three ships, Admiral Baird, not knowing the force which had escaped, had to raise the blockade. He feared for Admiral Rowley, who, if he was caught by a superior force, would, by the rules, be considered captured. In real war, under the same circumstances, Admiral Rowley could be relied upon, in case he was attacked, to hold his own in touch with the enemy for twenty-four hours, without suffering defeat in a decisive action, so long as he had sufficient speed.

Admiral Baird had no reserve fleet in England, and the conditions under which he blockaded, as regards distance from base and power of receiving and giving information, were far more unfavourable to him than they would have been had he been blockading Brest or Cherbourg.

The Commanders, had they been blockading these ports with a properly constituted squadron, could despatch after the enemy's escaped ships a slightly superior force, within twelve hours of their escape. I assume that they would know *when* the enemy's ships attempted to escape, and that two or three hours after daylight the

¹ On this subject *vide* Appendix A.

² See page 420.

next morning (if they had broken out in the night) their in-shore squadron would discover *what* ships had done so. With the remainder of their force they would maintain the blockade, having taken care to preserve their relative superiority over the enemy's ships left.

The escaped forces, if all went well with them, and they were successful in effecting a junction with their transports, would, if they attempted to land anywhere between Portsmouth and the Downs, be subject to interruption from ironclads in under six hours. In under twelve hours they would be attacked by a superior fleet, against which they could have no reasonable hope of success.¹

What force could be disembarked in six or even twelve hours? If men and guns *were* hurried ashore in fear of hourly interruption, there would still be no time to land stores and ammunition in quantities sufficient for their purpose.

In twelve hours' time if his ironclads were defeated, consider what the condition of an enemy who had landed would be: in rear, all retreat, power of reinforcement, and supplies cut off; in front, the country devastated by a hostile population, an army waiting to fight for hearth and home.

Who can doubt the result? Who can even maintain that an enemy would run such risks, with other means open to him of damaging us?

I cannot think he would be so rash, in view of almost certain failure. I therefore conclude that:—

ii. Given an adequate naval defence, and proper organization of the land forces as a *second line*, no enemy would risk attempting an invasion under cover of war-ships which had evaded our main fleets. That, therefore, fortifications to meet such a contingency are superfluous, and should not be undertaken.

I will now proceed to those duties of the Fleet which I have termed iii (a) and (b), viz.:—

(a.) Patrolling trade routes.

(b.) Keeping open the approaches to commercial ports.

Whilst our trade over sea is large and vital to our interests, our enemy's will be small and immaterial to him. We must, therefore, have a safe-guard against his isolated cruisers, who may be outside our grasp at the beginning of the war, or who may entirely escape the vigilance of our blockade; and also more particularly against those small fast craft that may be fitted out for service in the narrow seas from commercial ports, either by the enemy's Government or by private enterprise.

Fortifications, outside the *rayon* of their guns, are no answer to such ships; cruisers are necessary for their destruction. Thus an enemy's ship could lie 15 miles off the entrance to a commercial port and destroy every merchantman that approached it; fortifications would be powerless to prevent her doing so. On the other hand, one of the C class of corvettes or "Heroine" class (unless for patrolling

¹ See Appendix B for combinations to illustrate and prove these points.

long distances), assisted by a couple of torpedo-boats, would be a sufficient answer to the majority of an enemy's cruisers. The point where the trade routes converge on a port, an enemy's most profitable field of adventure, would thus be denied to any but the heaviest class of his ships. If these ships are sufficient to protect merchantmen from capture by a certain force, they are also capable of defending the port against the attack of the *same force* under all ordinary circumstances.

Therefore I conclude that:—

iii. To a great extent ports are protected by those ships which it is necessary to provide for defending trade in their vicinity. That, in consequence, if it is a question of providing ships or forts, and both cannot be provided, the former should be preferred.

PART II.—*Cases in which Defence by the Fleet becomes Inoperative, and Attacks to which Territory could be subjected.*

From my conclusions in Part I it will be seen that, assuming we have maritime supremacy, the chances of territory being subject to attack are very small. Even if the enemy evaded our ships, the time he would have free from interruption would be short; but it must be borne in mind that if a place be entirely unprotected, though the time at his disposal may not exceed one or two hours, the damage inflicted in even that time may be irreparable.

The destruction of our great arsenals, with all their means of refitting ships, would be a most serious blow. Coal is a necessity both for men-of-war and merchantmen; indirectly, it is the life of the United Kingdom, for without it neither food nor raw material could reach us. In coaling stations abroad we might be seriously crippled by its wholesale destruction.

The risk, therefore, of blindly rejecting *all* passive defences is apparent; notwithstanding that our naval forces may be always superior, they may experience temporary reverses or evasions,¹ rendering shipping ports open to attack for a limited period.

Take, for instance, the case of the naval ports at home in the event of war with France. An enemy would, if he broke the blockade, get between twelve and twenty-four hours free opposite Portsmouth or Plymouth.² Knowing these ports to be unprotected, he would run great risk to destroy everything in them. The naval force patrolling the coast would be powerless against three or four modern ironclads, which force it is at least conceivable might break away.

Primâ facie, every port on the south coast would be subject to a similar *coup de main*. It would, however, only be worth the risk (of being cut off) in the case of the very large commercial ports and naval arsenals. The damage he could do other ports in the time, even if they were undefended, would not affect the course of the war to any appreciable extent.

A single fast cruiser, however, which had escaped with the view of

¹ Such as are considered in Appendix B.

² See Appendix B.

committing depredations on our commerce in the narrow seas, must, for these ports, be taken into account. Her career should be short; the patrolling cruisers along the coast, the vessel or vessels keeping open the port, and the torpedo-boats should render a good account of one or even two of such vessels. In the United Kingdom, if the enemy succeeded in defeating or even sinking the force mentioned, she would herself be badly crippled. The telegraph would bring reinforcements in a very short time, as the cruisers here would have to be numerous for the protection of commerce.

In the case of ports depending on *caissons* or dock gates, an enemy might run in and do enormous damage in half an hour, before a naval force could appear on the scene. Such a contingency must be guarded against.

The case of commercial ports and coaling stations on the trade routes abroad may be very different.

After the mobile force keeping open the port had been captured or sunk, the enemy, had he a single gun left fit to fire, and a small force to fight, could enter the port and coerce the inhabitants into supplying his wants, if it were unprotected. He would, in many places, have plenty of time to refit, before naval reinforcements could appear.

The attack to which naval arsenals *abroad* could be subjected must depend on the force which the enemy maintains within striking distance in time of peace. In proportion to that force they will be open to the same attack by invasion as the home arsenals. The time an enemy would get free would, however, be greater, on account of the greater distance our Fleet would be from its base, and the uncertainty attending telegraphic communications over sea.

Our possessions abroad are not, as a rule, on account of their distance from possible points of embarkation, liable to invasion or siege by land and sea. We would, therefore, for these places provide no reserve fleet, and, consequently, our main fleets, although superior, would stand more chance of reverse than those at home, which would be capable of speedy reinforcement.

Except in the Mediterranean, large naval forces are not maintained abroad by the European Powers.

The largest force is in China, where France and Russia combined maintain two armoured cruisers, three or four cruisers, and several smaller vessels. Our naval force there is sufficient to cope with them. Holland also maintains a strong force with headquarters at Batavia. China and Japan have modern squadrons; they may, however, be set off against one another, as, whichever side one takes, the other will probably take the opposite.

It must be borne in mind that ports over 1,500 miles from those of an enemy are not open to ironclad attack. Except ourselves, no European Powers have ironclads possessing a coal endurance of over 4,000 miles at 10 knots. Such vessels would not be risked on distant enterprises.

From these considerations I draw the following conclusions:—

iv. Fixed defences are desirable for naval arsenals and great com-

mercial ports at home, to hold them against a dash made by iron-clads which had succeeded in evading our blockade until such time as we could depend upon overtaking them with superior naval force.

v. Similar defences are necessary for naval arsenals abroad. They should be on a much smaller scale than those in iv, as not being open to attack from a heavy force despatched from Europe.

vi. Coaling stations and commercial ports abroad should be defended against one or two fast cruisers which had succeeded in defeating the naval force keeping open the port. Allowance should be made for their having already fought an action.

vii. The case of smaller commercial ports at home must be considered according to their relative importance, observing that an enemy's cruiser could blow in dock gates and do much damage in half an hour.

PART III.—*Nature of Fixed Defence considered Necessary, having regard to Conclusions in Parts I and II.*

I have (in Parts I and II) pointed out the necessity of having our sea communications perfect. In any system of defence, whether by ships or forts, good communication should exist along the coast with the naval ports and with the capital. As I have concluded that in our case the defence will be principally by ships, numerous signal stations will be necessary in telegraphic or telephonic communication with one another. Such stations would always be liable to a light attack of an enemy who wished to cut our coast communications as part of some pre-arranged *coup de main*.

The possibility of such being accomplished by a couple of boats' crews or torpedo-boats could be guarded against by having the dwelling places of the Coastguard suitably built to resist musketry. But attempts to spend money on any more elaborate defence should be very jealously guarded against. The heavy expense precludes the use of underground cables; the main lines of wire could, however, at small extra cost, be retired about 7 miles from the coast line; the wires from each station should lead direct inland to them, and the junctions should, where possible, be near a railway. This would allow of troops being concentrated in sufficient time and numbers to prevent a small party capturing a Coastguard station, following up the wires, and cutting the main line. This service would be one properly performed by the local military Reserve forces. The first duty of the Coastguard on being attacked would be to telegraph to their junction, so that proper precautions might be taken. Taking the wires from a station underground for a *short* distance or over inaccessible ground would tend to throw an enemy out in such an enterprise.

In dealing with the ports spoken of in Part II, as requiring local fixed defence, I shall divide them into four classes, viz.:—

(a.) Naval arsenals and great commercial ports at home (the former including both public and private building yards).

(b.) Small coaling stations and commercial ports at home, not included in (a).

(c.) Naval arsenals and great commercial ports abroad.

(d.) Coaling stations and commercial ports abroad not included in (c).

My conclusions in Parts I and II, if correct, enable me to assume that these ports want protection against a dash made with the object of doing as much damage as possible in the time, that this will be limited by the operations of our ships, and that we have no reason to fear their being besieged by land and sea.

The defence should consist of two parts, viz. :—

(a.) The active defence, consisting of all ships in the vicinity of the port, and torpedo-boats.

(b.) The passive, which only comes into play on the failure of the active defence. It consists of (1) mines, (2) water defence, and (3) guns.

With (a) I do not propose to deal, except in relation to the probable condition the enemy would be in after an action, before he could engage the passive defences.

All ports are particularly liable to an enemy's ships entering and blowing in dock gates and destroying stores, after having run the gauntlet of the gun defences.

This can only be effectually guarded against (in large harbours with fairly narrow entrances) by a mine-field, and constant vigilance, both on the part of those ashore, and also any active defence that may exist.

Electro-contact or observation mines should be used if it is not desired to close the port. The latter are best, as being safest for friends. A marked channel should be left, and a pilot would always be necessary.

This mine-field would require protection to prevent its being countermined for the passage of ships. This should consist of

(a.) Quick-firing or light guns and machine-guns sweeping the field.

(b.) Electric lights for the detection of an enemy's countermining or torpedo-boats.

(c.) Guard-boats to give ample warning, and, if possible, deal with the enemy's boats before they can get on the field.

This defence is of itself sufficient if an enemy cannot spare more than four hours, providing that it is sufficiently advanced to prevent his undertaking a distant bombardment. This can be guarded against by having rifled howitzers mounted in suitable positions in advance of the mine-field. As they can be placed behind any interposing high land, or in earthworks, they are very cheap. In conjunction with the Watkin range- or position-finder, they are also very efficient. Ships could not remain at anchor where such ordnance was mounted, and no distant bombardment could be effective without their being so.

Had an enemy more time at his disposal, he could enter the port by first silencing the covering quick-firing guns of the mine-

field and then countermining it. A force of two cruisers and a depôt ship would, however, be necessary to undertake this.

To meet this contingency in ports open to it, a main gun defence must be provided in advance of the mine-field. Its nature must depend on the force by which it is considered the port is liable to be attacked; it must be so placed that an enemy cannot silence the guns covering the mine-fields without having the guns of the main defence to deal with first.

To prevent surprise, every ship entering the port should be made to stop outside the defence. One guard-boat should board her, another lie off at some distance. If all was right, the first boat would signal to the defences. The Officer of the first boat would pilot friendly vessels in. Ships not complying with the port regulations would have to stand their chance of being fired upon or blown up. This would complete the arrangements for the defence of the sea side.

Defence for the land side should be merely sufficient to prevent an enterprising enemy attempting an attack with a small force on the rear of the sea defence. With few exceptions, defences should not be erected to withstand a siege, and positions for heavy guns are unnecessary.

The late Major Walker has suggested suitable infantry keeps. In view, however, of the difficulty an enemy would have in landing even the lightest artillery, the utility of the provision of bomb-proof appears doubtful.

As the attack to which ports are liable can only be of short duration, defences need only be sufficient to delay it until relief can be afforded by adequate naval force. Care should be taken that they are of a nature that will require the smallest possible garrison. Guns should be mounted in the most modern way to ensure their requiring small gun detachments. Men are more usefully employed as a mobile force, whether ashore or afloat, than in permanent fixed positions.

In dealing with the four classes of ports of my essay, I have in the following pages assigned a typical armament to each class.

Naturally, local conditions would modify this, and no hard-and-fast line could be drawn without considering each port of the Empire separately. I regard this as a technical question, not within the scope of an essay on a general subject. The details concerning the mounting and disposition of the guns, and the positions of the mine-fields, I look on in the same light. These reasons, combined with the fear of making the essay too long, have induced me to dispense with anything more than a general survey.

(a.) *Naval Ports and Great Commercial Ports at Home.*

From the conclusions drawn in Appendix B, it is apparent that an enemy can only get twenty-four hours opposite any of these ports free from the interruption of a superior force. He will have an inferior force in observation in under twelve hours.

The force which might escape from his ports must be proportional to the force blockaded there. It is at least unlikely that more than half of it could so escape. If the whole got out and evaded the blockaders, the latter could only fall back on the English coast, and await certain information, which, by telegraph or cruiser, or a combination of both, should not be long in reaching them. Consequent eventualities have been already fully discussed in the first half of Part I of this essay.

Taking into consideration the actual number of ironclads possessed by foreign Powers, and the difficulties in their way, it may be, I think, safely laid down that not more than four would escape.

Even should they be more numerous, they would hardly be used to bombard or raid a port, with a superior hostile force within twenty-four hours of them. Both the ammunition and coal they carry are limited, and although they might do great damage, yet the risk of being cut off with exhausted supplies of either must remain a great deterrent.

The defence should therefore be as against four ironclads for a period of forty-eight hours, which allows a good margin of time. This would be sufficient to compel the largest force to expend a large amount of ammunition, the danger to them of which has already been pointed out.

In arranging such a defence, credit must be taken for the guns ashore, for the following points, as against ships:—

(1.) They can, and the ships cannot, always know their distance accurately, by either the Watkin depression range-finder or position-finder.

(2.) The heavy guns can be almost absolutely protected against gun fire, as there is no limit to the weight of their protecting armour, or the thickness of their earthworks.

(3.) They can have an unlimited supply of ammunition.

(4.) The garrisons can be constantly reinforced.

If we take four ironclads, accompanied by cruisers, we find their armament to be somewhat as follows:—

12 71-ton guns,
110 4-ton guns,

with a proportion of quick-firing and machine-guns.

The following guns, all able to bear on an enemy at the same time, would be a sufficient answer to such a force, and would hold a much larger one in check for twenty-four hours:—

6 12-inch howitzers,
6 13½-inch guns (68 tons),
30 6-inch B.L. or 15 100-pounder quick-firing,

and a proportion of smaller quick-firing and machine-guns.

The port should also have the mine defence, previously mentioned, covered by the electric lights and quick-firing guns. Guard-boats

should also be provided, as also the light land-side defence already mentioned.

The ports to be included in the general scheme of defence are as follows :—

Leith (Firth of Forth).	Portland.
The Tyne.	Milford.
The Thames.	Liverpool.
Portsmouth.	The Clyde.
Plymouth.	Queenstown.

Malta and Gibraltar, though strictly speaking not home ports, can be best treated of here, as they must be the subject of special consideration.

In a big war it might be necessary to abandon the Mediterranean and Suez Canal routes to the East, especially since the opening of the Canadian Pacific route. By blocking the Suez Canal, and having a force at Suez to keep it blocked, we could prevent the egress of an enemy's ships by an adequate squadron at Gibraltar. This would require a far smaller force (see Appendix A) than would be necessary to maintain the command of the Mediterranean, and the safety of our sea-borne trade to the East in it.

In this event Malta would be open to a regular investment, and should be fortified accordingly.

Gibraltar being in foreign soil and coveted by many, great risk would be run to capture it. If strongly defended, it might be of great help to a squadron stationed there for the purpose of closing this egress from the Mediterranean. Taking this, its natural advantages, and the money that has already been spent into consideration, I am of opinion that it should be in the position of a strong first-class fortress. A good flotilla of torpedo-boats should also be organized there.

(b.) *Small Coaling Stations and Commercial Ports at Home not included in (a).*

It has already been pointed out that where the ports are comparatively small an enemy would not run the risk of having his ironclads cut off by attacking them. It would, however, be within the province of one or two fast commerce-destroyers, detached from the enemy's main fleet, to attack the smaller commercial ports (*i.e.*, ports whose destruction would not affect the course of the war by crippling the resources of our ships).

Our patrolling cruisers should, as a rule, be able to deal with such vessels, and a very light defence representing a delay of about six hours would be quite sufficient.

Cruisers, as a rule, have no guns heavier than our own 6-inch, and even if they had, our 6-inch is still heavy enough to attack the majority of them with.

The mine-field, with quick-firing guns, electric lights, and guard-

boats, would be sufficient to keep a port safe for six hours. To prevent distant bombardment, three or four 9-inch rifled howitzers should be mounted in advanced positions. In some cases the addition of four 100-pr. quick-firing guns might be advisable. Land-side defence should be of the very smallest description. Works of a permanent nature are hardly necessary. More than 300 men could not be landed, and a force amply sufficient to deal with them (about 600 men) should be easily concentrated in a very short time. The ports for which such a defence is necessary are as follows:—

The Humber.	Londonderry.
Yarmouth.	Waterford.
Dover.	Limerick.
Alderney.	Barrow.
Falmouth.	Tees approaches.
Bristol Channel ports.	Wear approaches.
Holyhead.	Firth of Tay.
Dublin.	Firth of Moray.
Belfast.	

Other ports I consider it would be better to leave unprotected. If there was no defence, he could have no excuse for bombarding towns on the sea-board.

(c.) *Naval Arsenals and Great Commercial Ports Abroad.*

These ports are not within striking distance of battle-ships. An examination of the force maintained by European Powers on foreign stations shows that at the most two armoured cruisers could execute a *coup de main* against them.

Against any prolonged operations the Fleet are a protection, on the principles that have been already discussed in Parts I and II. The distance from our bases to the enemy's ports are much greater, however, abroad than in the United Kingdom. The result of this would be that an enemy's main force having evaded ours would have a longer time free from interruption. They would still have to deal with a local naval defence keeping open the port, which might also be reinforced by cruisers patrolling the routes leading to it. The local force referred to would be such as exists in Hong Kong, which may be taken as typical, viz., H.M.S. "Wivern," four 125-foot torpedo-boats, two 85-foot ditto, two 65-foot ditto, and two river gunboats; this force might be strengthened in war by the addition of either one of the C, or "Heroine" class of corvettes. No reserve fleet is, or is likely to be, maintained in foreign waters, with the exception of Australia, where the newly formed Australasian squadron may be looked on in that light, and therefore as a protection against invasion on the principles already laid down.

Where our possessions abroad are small in area and isolated in position, simply forming links in our chain of communications, their protection in the event of disaster to the naval forces in the sur-

rounding waters is on a different footing from that of the United Kingdom, or other places of large area and sea-board. In these cases, fortifications would undoubtedly be better than the provision of a reserve fleet. But in any case defence against a prolonged attack would be a mistake.

If a port is to remain of any service it must be relieved by a naval force despatched, if necessary, from home. If it is closed to us, it would be of no further use, and should be allowed to fall into the enemy's hands rather than fortify it heavily in peace against the contingency. Such heavy defences are not only unnecessary in themselves, but engender also a false sense of security; the effect of this might be the reduction of the naval force in foreign waters to numbers insufficient for the protection of trade and communications, functions which no fortifications can perform by sea.

The following gun-fire would be a sufficient defence for the ports under consideration, viz.:—

2 9·2-inch B.L. guns.
4 100-pounder quick-firing guns.
5 9-inch howitzers.

The mine-field, &c., to be provided as in the naval ports at home.

The following are the ports for which a defence of this type is recommended.¹

Kurachi.	Sydney.
Bombay.	Hobart.
Colombo.	Cape Peninsula.
Calcutta.	Mauritius.
Rangoon.	Halifax.
Singapore.	Bermuda.
Hong Kong.	St. Lucia.
Albany.	Esquimalt
Melbourne.	(Vancouver's Island).

(d.) *Small Coaling Stations and Commercial Ports Abroad.*

Ports which have no docks or great commercial interests, or which *must* be near the protection of a comparatively large naval force, do not call for so large a defence as the ones mentioned in (c).

They should have the mine-field, with its covering lights, quick-firing guns, and boats, where applicable. Beyond this the defence must vary with the port; the gun power should consist of from two to six 100-pr. quick-firing guns (or equivalent gun power), and from two to six 8-inch or 9-inch howitzers. The land-side defence should be of the smallest description.

The following are the ports included in this category:—

¹ In ports where submarine defence is inapplicable, a heavier gun defence would be needed.

Perim.	Fiji Islands.
Aden.	Sierra Leone.
Penang.	Ascension.
Labuan.	St. Helena.
Sandakan.	Mombasa.
Auckland.	Jamaica.
Adelaide.	Falkland Islands.
Brisbane.	Wellington, N.Z.

Cyprus, Port Said, and Suez have been purposely omitted. Should we intend to keep open the Suez Canal, or annex Egypt, these places will require special consideration. As it is, they do not come within the scope of this essay.

PART IV.—*Control and Personnel of Coast Defence.*

The want of organization of the fixed defences of our coasts, both at home and abroad, has been for many years the subject of outspoken adverse criticism, both from our own countrymen and from foreigners. The prevailing opinions on the subject may be fitly summed up in the words of Lieutenant Colwell, of the United States Navy, an unprejudiced observer, who says :—

“The coast defence of Great Britain is notably the most inefficient of any of the great European Powers. Owing to the divided control, lack of co-operation, absence of digested schemes for mutual support, and the mixing of naval and military duties, the defence is unwieldy in its administration, unprepared for sudden work, and labours under the disadvantage of placing military men in situations outside their legitimate sphere of action.”

Present efficiency cannot, therefore, be urged as a reason against changes in the future.

In our system of defence, our 1st line, the Navy, and its bases and points in the lines of communication over-sea, are under separate control.

Our Navy corresponds to a Continental field army, and our arrangement is much the same as if Germany, for instance, had her frontier fortresses and lines of communication under a different department of the State from her Army Corps.

If the conclusions at which I have arrived in the preceding portions of this essay are correct, the Army can only form part of this 1st line,¹ when the operations of the Fleet (strictly defensive) have so far secured the command of the sea as to admit of the delivery of a territorial counter-blow. In this stage of a war, the Navy would be powerless without the co-operation of the land forces. Until this state has been reached, the Navy can only be looked on as a defensive force. Masking an enemy's vessels on the sea, in peace-time neutral and free to all, and subject to no special nation's jurisdiction, can by no possibility be considered as offensive operations. A mistake is therefore made when we hear it occasionally stated that the Army

¹ Except in the case of the land frontiers of India and Canada.

frees the Navy for offensive operations, the fact being that the direct opposite is the case.

The only places that require fortifications are those, as I have already shown, which form part of the defence by the Navy; it, therefore, appears natural that the control of their defences should rest with that force; a misconception as to how far they can be covered by it is sure to, and does, in fact, arise, where their defence is controlled by a totally different authority. Thus, costly fortifications have been constructed, involving a large waste of both men and material; the former would, in most cases, be of much greater use as part of a field force, ready either to meet the improbable contingency of a hostile force landing, to embark at short notice, to deliver a counter-blow, or as reinforcements to those ports of our Empire which have land frontiers.

I therefore conclude that—

viii. The defence of all naval bases and commercial ports should be under the control of the Naval Administration, and that, consequently, the charge for them should be borne on the Navy Estimates.

This course has already been followed in the case of naval ordnance, without at present any change taking place in the personnel. Referring to this subject, Lord George Hamilton, in his official Memoranda on the 1891-92 Estimates, says:—

“There are Officers in both Services who believe that this transfer of duties from the Army to the Navy might with advantage be pushed much further, and measures should at once be taken by which the Navy should immediately undertake the defence of the great naval ports, and be, in time of war, responsible for the safety of the base of their own operations. I admit that, if such a change could be carried out, it would tend to secure *unity of action and responsibility*, and would, in any emergency, secure at the great naval ports the *rapid utilization of all available resources*, for whatever movement the exigency of the moment might require.”¹

Sir William Jervois, from his position as a distinguished soldier and an ex-Colonial Governor, well qualified to judge, advocates the Navy taking over complete control.

In the unlikely event of invasion or shore operations, the naval personnel would, where necessary, serve cheerfully, as they have done before, under the orders of soldiers and the War Ministry.

One or two instances will show how much unity of action is at present wanting. The Army have made little or no provision for guard-boats for the mine-fields; they rely upon the Navy, who have no arrangements. The Army have no Officers capable of undertaking the organization and command of such a force; such should be both trained to the sea and to arms, combinations only found in the sea service; the work requires careful training and considerable practice in peace.

No arrangements again are made for the co-operation of torpedo-boats, although, in most ports, they are provided. Without such,

¹ The *italics* are mine.

boats driven in to take shelter in a harbour would run a great risk of being sunk by their friends' guns.

In further support of this view of the question, it should be noted that the navies of every important European Power have charge, or partial charge, of the coast defence.¹

Apart from the question of control and estimates, is that of the provision of the personnel. As has already been mentioned, naval ordnance has been placed under the control of the Admiralty, and the cost borne on the Navy Estimates, without any change at present in the personnel. It is, however, desirable that men paid by, and under the direction of, one department of the Administration, should, if possible, be trained by that department, and, as a rule, spend their life in its service. By this means only can they be sure that those employed are such as they consider efficient for the work. In a sphere of naval operations, such as the defence of our distant trade routes, where the Army as an Army have absolutely no *raison d'être*, the naval Commander should have the chief control of his base and the points along his lines of communication. Such an arrangement need not entail his remaining at any one of these points, although in some cases it might be convenient for him to do so; the Commanders of the strong places should be simply under his orders.

There appears to be no reason to suppose that a naval Officer is not as well fitted to command a coast fortress as an infantry General; the latter has technical advisers under him,² the former would have the same. On this point the opinion of an Officer of Royal Artillery is very valuable. Lieutenant-Colonel Walford,³ referring to such a Commander, says:—

“There appears to be no reason why such a command should not be entrusted to an Officer of either Service.”

From these considerations I believe that it would be better to provide a purely naval personnel for our coast defences.

The active or sea defence, namely, such ships and torpedo-boats as may be detailed to keep open the port, I do not intend to touch on, as it must obviously be purely naval. The passive defences, divided into three parts, are as follows:—

- (a.) The main gun defence.
- (b.) The mine defence.
- (c.) The land-side defence.

The personnel of (a) could be well supplied by the Royal Marine Artillery, and be commanded by an Officer of that arm. Such Volunteers and Militia as are now told off to assist in this defence could be transferred to the Admiralty. The same arrangements could be made with native troops, who in this case would eventually be officered from the Marines.

Marine Artillery, from their sea training, should be far better able

¹ See Appendix C.

² Viz., Officers Commanding R.A. and R.E.

³ Lecture R.U.S.I., January 22, 1890.

to understand and deal with attack by ships than shore gunners ; the R.A., for the most part, are ignorant of the construction and mobile power of men-of-war, and are deficient in the faculty of rapid identification of such ships. Their system of officering is very bad. Many junior Officers are sent to garrison batteries who hate the work ; their only idea is to get transferred as speedily as possible into Field or Horse Artillery. How can it be expected that such men will take any interest in the slow movement and want of dash of a coast battery ? Contrast men shut up in an earthwork, with a 6-inch gun and their coats off, with the glitter and dash of coming into action with a horse or field battery, to say nothing of the far better chance an Officer has of seeing active service with the latter branches. If this defence is to be kept by the Royal Artillery, the Officers, as well as the men, must be specially trained for that purpose.¹

We now turn to the mine defence, which is, at present, so far as the mines and lights are concerned, in the hands of the Royal Engineers, or rather a special corps of Submarine Miners, who also have charge of the auto-mobile and dirigible torpedoes.

The covering guns, quick-firing or otherwise, are worked by the Royal Artillery. The guard-boat or water defence does not exist in any organized condition ; a naval Officer should in any case superintend it.

This section of the defence would then be under three heads, and three sets of Officers, an arrangement hardly likely to lead to unity of action, even when the functions of each and the extent of their commands are very clearly laid down.

As regards the Submarine Miners, there would appear to be no great difficulty in transferring them to Admiralty control ; submarine mining is their only duty, and if the coast defence were turned over, the Army would have no further use for them. The present arrangements cannot, however, be called perfect. The men have a "long shore" training in pulling boats and steam launches. The Officers do not, however, acquire the habit of commanding on the water ; with a few exceptions they are quite incompetent to do so. Sailors will work on the water during weather which will confine submarine miners to dry land, their proper element. The difficulty with the men can be obviated by enlisting merchant seamen ; that of the Officers cannot be so easily got over. To see them directing any work on the water is not, as a rule, edifying to a sailor.

In some of the bigger mines, the want of a responsible seaman in charge was greatly felt. This was met by enlisting men with "Masters' certificates," of course on the promise of rapid promotion and a higher rate of pay ; it is needless to say that these inducements would not be likely to tempt the better classes of Officers in the mercantile marine. In a boat of 150 tons displacement with one of these men in charge, an Officer of Royal Engineers, though really in command, would find it very difficult to interfere with the dicta of his

¹ The above was written in May, 1891. Since then "the right of fall" has been abolished and Officers are now appointed to the Garrison Artillery for their service career.

subordinate ; he would be in a most undesirable position, as the latter could, at the most, be only a Warrant Officer.

These objections do not apply to torpedo Officers in the Navy ; they are already acquainted with the more elaborate system of mining used by the Royal Engineers, which *may* be necessary on account of its permanent nature, and the means existing in it for accurate testing. The naval system is a rough and ready one, which might not be good enough for mines which it is desired shall be submerged for a long period. If torpedo Officers had a longer course in the "Vernon," there would be no doubt of their being perfectly capable of doing the work, and this the Royal Engineers themselves acknowledge. The course at the Naval College might be shortened proportionally for all but men of the greatest talent. As the Navy already work their own electric light and auto-mobile torpedoes, this part of the defence would be nothing new to them. The number of torpedo Officers would have to be largely increased. They should spend at least half their time in sea-going ships. At present they do no more : out of forty-eight Lieutenants, twenty-one are employed in harbour or shore appointments. There would be no difficulty in arranging it, as it would be very advantageous to have a torpedo Lieutenant in many ships which do not now carry one. He could always in the smaller ships take his ordinary turn for duty.

Seamen are quite as capable of handling quick-firing guns as men of the Royal Artillery, whether they are in fixed positions or on field carriages, as long as in the latter cases they are used without horses. In the event of the whole mine defence being undertaken by seamen, the number of torpedo men who would require more training than they at present receive would be very small. The bulk of them would learn all that was necessary during a month's additional training. A few men similar to the present leading torpedo men and torpedo instructors would receive a more advanced course, which would not take them more than three months longer than the course they at present go through.

The most important objection raised against seamen undertaking this defence is that they would be withdrawn from the service of the Fleet, and, losing their identity as sailors, would become as much a special corps as the Submarine Miners, whose training would be less expensive. I believe these fears to be quite groundless. These men would be just as useful in a seaman's capacity after they had qualified in torpedo as are the present torpedo men ; in the latter capacity they would be of far more use. To prevent their always serving on shore, they should be in sufficient numbers to admit of at least half of them being afloat, as part complement of ships of war, where they would be employed at the electric light, torpedo tubes, and quick-firing guns, and at mining work when required. It might be found desirable for the men to divide these functions into two specialities, as, for instance, mining and electric light forming one, mobile torpedoes and quick-firing guns the other.

If a vessel of the "Cruiser" class were stationed at our ports, it would be advantageous, not only for these men, but also for the or-

dinary crews of harbour ships, who are much more likely to lose the instincts of a sailor, serving as they do in stationary mastless ships, with none of the useful boating work which would be part of the torpedo corps' every-day duty.

The entries for the Navy would have to be increased, which would be a great advantage, for the additional men under training would be available to *man our ships* in time of war, as in that event all discharges would, of course, be suspended.

I am, therefore, in favour of the seaman class doing the mining; firstly, because they would be more efficient, and, secondly, because the number of men available for sea service on the outbreak of war would be largely increased.

If, as an alternative, the Submarine Miners, as they stand, be placed under Admiralty control, I would urge the necessity of recruiting them in the future from a seafaring population, and of officering them with Lieutenants in the Navy qualified in torpedo. They could still retain their character of a separate corps if considered desirable, although I believe the previous plan would be far the most efficient.

The defences of the land side should be entrusted to the Royal Marine Light Infantry, which is as good as any in the world. In the few places where field artillery is required, it could (as in foreign services) be supplied by the War Office, and the cost borne on the Navy Estimates. Where mountain artillery is necessary, the Royal Marine Artillery should provide the personnel.

To summarize my proposals:—

(a.) The naval base and all points in the lines of sea communications to be under the supreme military¹ control of the Naval Commander-in-Chief.

(b.) The Commander of each of these posts to be either a naval or military Officer.

(c.) The personnel of these posts to be as follows:—

Main gun defence.....	Royal Marine Artillery.
Mines, lights, covering quick-firing guns, torpedoes, and water defence.....	Torpedo men from the Royal Navy.
The land defence.....	Royal Marine Light Infantry.

All the above under their own Officers.

In case of invasion, men not wanted in coast fortresses, or more urgently needed as a mobile force, could be formed into marine brigades and divisions and turned over to the War Office, under the command of a marine Officer.

Fortress engineers would be necessary to look after the construction and repair of shore defences, on both the land and sea sides. Three means of providing the personnel of such a force suggest themselves, all of them equally good:—

¹ As opposed to civil, with reference to civil populations.

(a.) To use the Royal Engineers under the same conditions as suggested for the field artillery.

(b.) To allow a certain proportion of Officers Royal Marine Artillery to go through an advanced course of fortification, and to use civilian labour.

(c.) To have, as suggested by Sir William Jervois,¹ a special corps of Royal Marine Engineers.

Finally, to supplement the personnel, I should urge that all civilian employ  s of the Government, particularly those whose work is of a seafaring life or "long shore" nature, should belong compulsorily to a Reserve Coast Defence corps, receiving extra pay whilst being drilled or embodied. This would include men employed in buoyage, lighting, customs, water police, and all the *established* personnel of our dockyards. As far as compatible with the duties, these billets should be filled by ex-soldiers or sailors.

The communications of the coast are already in the hands of the Navy with the exception of Lloyd's stations. Arrangements should be made to enable the Admiralty to take them over altogether in war time.

The Coastguard and Revenue cruisers should be vessels efficient for local or coast defence. All the garrison in turn should be exercised afloat, particularly in firing.

The changes advocated are undoubtedly very great, but I can see no means of obtaining the necessary unity of action without them, or something approaching them.

They should be accomplished gradually, so that ample opportunity could be afforded of observing whether the scheme was working successfully. If it was, it could be pushed to its limit; if not, the attempt could be modified or abandoned, and no harm could be done.

The first step would be to appoint a naval Officer to command the *active* defence of each port. He should be on the staff of the General, and his adviser in all naval matters. Under him should be a naval Officer to organize and command the water defence of the mine-field; his only other superiors would be the Commander of the mine defence and the Commander of the fortress, unless the Naval Commander-in-Chief be given control. These appointments should be made to all ports, whether their defence is or is not to be turned over to the Navy.

Defence by the Navy should first be tried in two ports, one abroad and one at home, let us say, Hong Kong and Portsmouth. For service in these places gradually increase the number of torpedo men, increasing the entries of seamen and decreasing those for the Submarine Miners and Coast Brigade Royal Artillery proportionally. When sufficient men had thus been trained, change *half* the personnel, seamen supplanting half the number of Submarine Miners, and half the Royal Artillery employed at the covering quick-firing guns. After a certain period, allowing time for the first half to acquire the necessary local knowledge, complete the change. The Navy would then have provided the complete personnel for the mine-

¹ "Home Rule for the Navy."

field, mobile torpedoes, electric lights, covering quick-firing guns, and water defence. Next, gradually replace the Coast Brigade Royal Artillery by Royal Marine Artillery, stopping enlistment and entry of Officers for the former and increasing them for the latter. When these changes were completed, a naval or marine Officer should be appointed to command the fortress, under the supreme control of the Naval Commander-in-Chief.

The charge of buildings, works, and stores could then be transferred from the Army to the Navy, and the whole cost of the garrison be placed on the Navy Estimates. After this, Royal Marine Light Infantry could be gradually substituted for Infantry of the Line, following the same course as regards entry and enlistment as for the Royal Marine Artillery. The change should then be allowed to work for two or three years. No great derangement in the scheme of defence would take place if it was effected in ten years; in twelve it would be in full working order.

If successful it could be extended to the whole sea-board of the Empire, which could be done with greater rapidity, as a nucleus accustomed to the work would already exist. The further extension would not take more than eight years. Thus in twenty years from when commenced, the change would be completely effected.

This scheme *partially* carried out would be better than not at all. The vital points I consider to be:—

(a.) That the Admiralty has control.

(b.) That the Naval Commander-in-Chief should be in chief command.

(c.) That the mines and their *water*-defence should be managed by seamen.

The other points, though desirable, I believe to be of less importance.

Conclusion.

In dealing with our coast defence, I have attempted to show,¹ and I hope successfully, the *primary* importance of our Navy: that it is our true first line: a defence both against the invasion of England, and of her very life, the sea-borne trade. The large armies and heavy coast fortifications of Continental Powers have been the red herring drawn across the track, diverting attention from our proper defence. In war is it good policy to wait on your frontier till attacked? The best authorities answer no, yet that is exactly what we must do if our Navy is not strong enough. The sea is our greatest highway; free to all in peace, it must be secure to us in war as having infinitely the greatest interests on it. On the course of a big naval war, land defences can have little or no bearing. No territorial attack can be made without naval war, which is the only one we can be forced to take part in.²

Before any local defence is undertaken, we must therefore make

¹ See Appendix D, "Summary of Conclusions."

² With the exception of India and Canada.

the Navy strong enough for the work it will be called upon to perform. Attack by sea must be met *on* the sea, a truism well understood by our forefathers, commencing with Sir Walter Raleigh, or even earlier, but seemingly, by many, lost sight of in these latter days.

I cannot claim originality for my opinions in the preceding pages. I humbly share them with many distinguished naval Officers, from whose speeches and writings I have been content to learn.

I cannot conclude this essay better than by quoting the words of three of these—three Admirals of the greatest experience, whose opinions are justly respected by all:¹—

“Without any desire to question the sums annually granted by Parliament for the maintenance of the Services, we cannot but note the disproportion in the appropriation when the magnitude of the issues involved is taken into consideration.

“It would, in our opinion, be far more in consonance with the requirements of the nation by the provision of an adequate fleet to render invasion an impossibility, than to enter into costly arrangements to meet an enemy on our shores (instead of destroying his armadas off our shores), for, under the conditions in which it would be possible for a great Power to successfully invade England, nothing could avail her, as the command of the sea once being lost, it would not require the landing of a single man upon her shores to bring her to an ignominious capitulation, for by her Navy she must stand or fall.”²

APPENDIX- A.

Force necessary for Maritime Supremacy.

The following table shows the force considered necessary by Captain (now Admiral) Cleveland and Lieutenant Bradford, respectively, for naval supremacy. The third line shows the mean of both.

¹ Admiral Sir William Dowell, Admiral Sir R. Vesey Hamilton, and Vice-Admiral Sir Fred. Richards.

² Supplementary Report of the Committee on the 1888 Manœuvres.

Battle-ships.	Belted or protected cruisers.	2nd-class cruisers.	3rd-class cruisers.	Torpedo gun-vessels.	Coal-ships.	Store- and ammunition-ships.	Torpedo depôts.	Coast-defence-ships.	Gun-boats.	Mine-boats.	Torpedo-boats.	Telegraph-ships.
72	47	82	108	90	20	10	9	52	53	114	184	—
83	15	103	69	38	—	—	6	—	59	—	196	4
78	31	93 ¹	89 ²	64	20 ³	10 ³	8	52	56	114	190	4

This allows for war against the two Powers and for keeping the Suez Canal route open and the trade in the Mediterranean protected. If that was not done (as suggested by Captain Cleveland) the Suez Canal would be blocked, and the Mediterranean blockaded from Gibraltar. This would require a less force by 12 ironclads, 10 belted or protected cruisers, 10 2nd-class cruisers, 6 3rd-class cruisers, 12 torpedo gun-vessels, 4 coal-ships, 2 store- and ammunition-ships, 2 torpedo depôts, and 12 torpedo-boats. The force thus required is shown in the first line of the following table: the force we shall have in 1894 (approximately) in the second:—

Battle-ships.	1st-class cruisers.	2nd-class cruisers.	3rd-class cruisers.	Torpedo gun-vessels.	Coal-ships.	Store- and ammunition-ships.	Torpedo-depôt-ships.	Coast-defence-ships.	Gun-boats.	Mine-boats.	Torpedo-boats.	Telegraph-ships.
66	21	83	83	52	16	8	6	52	56	114	178	4
64 ⁴	15	51	65 ⁵	46 ⁶	—	—	2	16	72	—	86	—

¹ A proportion could be armed mercantile auxiliaries.

² A proportion could be armed yachts or tugs.

³ Could always be extemporized.

⁴ Battle-ships and armoured cruisers.

39 3rd-class cruisers and 26 sloops.

⁶ 27 torpedo gun-boats and 19 gun-boats 1st-class.

APPENDIX B.

Examples of Enemy's Ships escaping from Blockaded Ports to the South Coast, with means proposed to check them.

Let us take Brest and Cherbourg as examples.

Call the British squadrons blockading these ports A and B respectively. Call the blockaded squadrons C and D, and the ships which have evaded the blockade, *c* and *d*. Call the ships detached from A and B to pursue these latter *a* and *b* respectively. Call our Reserve Squadron, stationed in the Downs, R.

If A's and B's cruisers did not succeed in keeping touch with *c* and *d*, and *a* and *b* had no certain knowledge of their whereabouts or ultimate object: then within 12 hours at the outside:—

a would proceed to Plymouth, 11 hours' steaming at 11 knots.

b would proceed to Portsmouth, $8\frac{1}{2}$ hours' steaming at the same speed.

When the Commanders found that ships had evaded their blockade they would send:—

One cruiser at 15 knots from Brest to Plymouth, from which place the coast and R would be warned by telegraph in 8 hours.

One cruiser at 15 knots from Cherbourg to Portsmouth, who would perform the same duty in 6 hours.

When the force of the escaped ships was ascertained, second cruisers belonging to *a* and *b* would proceed ahead and communicate with Plymouth and Portsmouth in the same times, or 3 hours and $2\frac{1}{2}$ hours respectively before *a* and *b* could do so.

On *a*'s and *b*'s arrival, they would, by means of the telegraph and coast stations, be in communication with each other, with R, and with every ship or boat along the coast.

Now, suppose an attempt to land in the vicinity of Plymouth.

Steaming 12 knots,¹ *c* and *d* would arrive there 10 hours after escaping. In 13 hours afterwards *a* would arrive at Plymouth; thus:—12 hours' delay and 11 hours' steaming, enemy taking 10 hours; but he would be inferior to *c* and *d* together. He would know, however, that *b* would reinforce him in $9\frac{1}{2}$ hours, thus:—12 hours' delay, $8\frac{1}{2}$ hours to Portsmouth, and 12 hours to Plymouth, total $32\frac{1}{2}$ hours' steaming, as against *a*'s 23 hours. Until reinforced *a* would keep touch with enemy and of his own coast stations. In $22\frac{1}{2}$ hours, therefore, *c* and *d* would have to fight an action against superior force if he remained on the spot. If he retired *a* would pursue, leaving directions to *b* to follow. The coast stations and cruisers, and the Plymouth torpedo-boats, would easily enable him to do so.

Now consider an attempt on or near Portsmouth. It would take *d* $7\frac{1}{2}$ hours, steaming at 12 knots, to get there; *b*, allowing the 12 hours' delay as before, would arrive in $20\frac{1}{2}$ hours, or 13 hours later (at 11 knots). It would take *c* 19 hours to get to Portsmouth. R

¹ I have supposed them to be 1 knot faster than our ships, although such should not be the case.

must hear of *c*'s departure, but not his *force* (by cruiser despatched by A to Plymouth, thence by telegram), in 8 hours after he has broken out. If R left immediately for Portsmouth he would (at 11 knots) arrive there 19 hours after *c*'s leaving Brest; in fact, at the same time as *c* would.

R would, as he proceeded westward, pick up all cruisers and torpedo-boats he could find, and spread in line across the Channel, so as to establish communication with B off Cherbourg.

In this case *d* would have 13 hours free from interruption; *c* would get no time free, as R would be in the vicinity of Portsmouth as soon as he.

R and *b* would then be in touch with *d*, whose retreat to the westward would be cut off by *a*'s keeping up communication between A and Plymouth.

If an attempt was made midway between Portsmouth and Plymouth, or in that vicinity, then *d* would arrive in about 9 hours, *c* in 11 hours.

Calling in for news first at Portsmouth and Plymouth, *b* and *a* would arrive respectively in 29 hours and 26 hours. Here the enemy would get 18 hours free from interruption.

An attempt made by *d* in the vicinity of the Downs would be met by R; *b* would hold the Channel between Cherbourg and Portsmouth, to prevent *c* effecting a junction. Seven ships 10 miles apart, in touch with St. Catherine's signal station on one side and B on the other, would ensure this.

If *d* made the attempt midway between Portsmouth and the Downs, or in that vicinity, he would only have $5\frac{1}{2}$ hours free before R's arrival on the scene. If *c* escaped at the *same* time, he would be at Portsmouth in 18 hours; *b* would be at Portsmouth $2\frac{1}{2}$ hours after (namely, 12 hours' delay added to $8\frac{1}{2}$ hours, total $20\frac{1}{2}$ hours). In 23 hours *c* would have joined *d*, of which junction *b* would be informed $2\frac{1}{2}$ hours *after* his arrival at Portsmouth, if he had not already intercepted him.

If he then started he would join R in under 6 hours' time (or 6 hours after *c* and *d* had joined), in time, in fact, to prevent him being crushed by *c* and *d*, supposing them to be strong enough to do it. Suppose *c* escaped 15 hours before *d*, so that they might effect a junction without having to wait for one another midway between Portsmouth and the Downs.

At Portsmouth his escape, but not his exact force, would be known 8 hours after (by cruiser to Plymouth, thence by telegraph). All the coast stations and cruisers would also be warned. In 23 hours after *c*'s escape *a* would be off Plymouth. A junction would at that instant have been effected midway between the Downs and Portsmouth by *c* and *d*. R would be $5\frac{1}{2}$ hours from them, but he might be inferior. A cruiser from Portsmouth to B would take 6 hours. R could therefore be reinforced by *b* in $14\frac{1}{2}$ hours, thus, 6 hours added to $8\frac{1}{2}$ hours (the time *b* would take crossing). R would be left in touch of *a* (perhaps) superior fleet for 9 hours.

It must be distinctly understood that I do not claim for these dis-

positions that they are the best possible. Neither do I wish to insist that the Downs would be the best strategical position for R.

The cases taken embrace most of the possible attempts on the south coast. My object has been to show that the longest time an enemy would get *free from interruption* between Portsmouth and Plymouth would be 13 hours, and the longest time free from a superior force $22\frac{1}{2}$ hours.

The longest time he could get free between Portsmouth and the Downs would be $5\frac{1}{2}$ hours, and the longest time free from a superior force 9 hours.

APPENDIX C.

Charge of Coast Defence Abroad.

In Germany the Navy have charge. Where they have not sufficient troops, the necessary numbers from the Army are placed under the orders of the naval Officer Commanding.

In France the Navy have charge of the defence of the naval ports. In other ports the Army provide the defence; the Officer in command of the naval force present is on the Staff of the General commanding the defences.

The Navy control the coast defence in Italy.

In Austria the direction of the coast defence is under the Ministry for War, of which the Navy is a section. The defence of the coast line is under the direction of the Commander of that army corps to which the coast belongs.

Pola is commanded by a naval Officer under the Commander of the army corps. The batteries are partially manned by the Navy; the mine defence is entirely in their hands. At other points naval or military Officers command, according as sea or land interests most predominate.

In Spain the coast defence is undertaken by the Navy.

In Russia the coast defence is undertaken chiefly by the Navy, except at such points where the defence of the land frontier is of greater importance.

The above information was obtained from a most valuable paper entitled "Coast Defence Systems" published in the Journal, Royal United Service Institution, vol. xxxii, No. 156.

APPENDIX D.

Summary of Conclusions.

(i.) Even if the main fleet sustain a defeat, the state of the enemy will not be such as to undertake an organized territorial attack in the face of Reserve or Flanking Fleet; consequently fortifications constructed to resist such an attack are unnecessary.

(ii.) Given an adequate naval defence, and proper organization of the land force as a *second line*, no enemy would risk attempting an invasion under cover of war-ships which had evaded our main fleets.

That, therefore, fortifications to meet such a contingency are superfluous, and should not be undertaken.

(iii.) To a great extent, ports are protected by those ships which it is necessary to provide for defending trade in their vicinity. That in consequence, if it is a question of providing ships or ports, and both cannot be provided, the former should be preferred.

(iv.) Fixed defences are desirable for the naval arsenals and great commercial ports at home, to hold them against a dash made by iron-clads, which had succeeded in evading our blockade, until such time as we could depend upon overtaking them with superior naval force.

(v.) Similar defences are necessary for naval arsenals abroad. They should be on a much smaller scale than those in (iv), as not being open to attack from a heavy force despatched from Europe.

(vi.) Coaling stations and commercial ports abroad should be defended against one or two fast cruisers, which had succeeded in defeating the naval force keeping open the port. Allowance should be made for their having already fought an action.

(vii.) The cases of smaller commercial ports at home must be considered according to their relative importance; observing that an enemy's cruiser could blow in dock gates, and do much damage in half an hour.

(viii.) The defence of all naval bases and commercial ports should be under the control of the Naval Administration, and consequently the charges for them should be borne on the Navy Estimates.

Friday, March 4, 1892.

LIEUTENANT-GENERAL SIR ROBERT BIDDULPH, G.C.M.G., C.B.,
Director-General of Military Education, in the Chair.

THE EMPLOYMENT OF PHOTOGRAPHY IN RECONNAISSANCE.

By Lieutenant F. J. DAVIES, p.s.c., Grenadier Guards.

It would be as well for me to begin by saying that it is not my intention to deliver a lecture on the science of photography, nor to attempt to teach my audience how to photograph. I intend to keep clear of theory as much as possible. I merely wish to bring to your notice some of the ways in which photography may be of use to soldiers.

Photography in the field has so far received official sanction that, I believe, it is proposed to attach a photographic equipment to the headquarters of an army in the field. I understand that two equipments have been prepared, one of which will be carried in panniers, on pack animals; the other in boxes, in a general service wagon. Both these equipments are very complete, and include large supplies of chemicals and other requisites.

I hope in the course of my remarks to be able to show that photography is a science of which soldiers can make very great use in time of peace, with a view to ultimate use in war, and further, that it is by no means impossible that it may be of service in time of war.

I shall endeavour, as far as possible, to avoid technical terms, and I shall not enter into the history of photography further than merely to mention the fact that it is the introduction of dry plates in the place of the old wet plates that has made this lecture possible, the salient advantages of the dry process being that we can take our plates into the field ready prepared, and that we can delay the development practically as long as we like.

I need not enter into the various improvements that have followed in the wake of the introduction of the dry plate process, I will only say that scarcely a week passes in which some mechanical or chemical improvement is not introduced; new and improved cameras, plates, films, paper, and developers succeed each other with astonishing rapidity.

I think that my lecture will be more intelligible to those who may not have practised photography if I describe very briefly and un-

scientifically the various operations which have to be gone through in order to produce a photograph.

First of all, we must have a camera with a lens; secondly, we must have a piece of glass, celluloid, or other suitable material which has been coated with some substance into the composition of which we need not inquire, but which is highly sensitive to light. When made of glass, this is called a "plate," when made of celluloid, a "film." This plate or film is placed in the camera in such a manner that, when the lens is uncovered, the light which passes through it falls on the plate or film.

To take a photograph, we permit the light to pass through the lens on to the plate for a longer or shorter period of time, according to circumstances; this is called exposing the plate. Exposure is of two kinds, "time," and "instantaneous."

The "image," that is the picture we are about to produce, has now been impressed on the sensitized substance with which the plate has been coated, but it is latent, invisible to the eye. To make this latent image visible we proceed to the second process, which is known as development.

Exposing the plate to a red light only, we pour upon it a solution, called a "developer," which causes the latent image to appear in the course of a few minutes. We next place the plate in another solution, which "fixes" the image, that is, makes it permanent. The plate can now be exposed to the light, and we have what is called a "negative;" it is an exact pictorial representation of what the plate saw through the lens, with the exception that everything is in reverse, what is black in nature is white in the negative, and *vice versâ*.

The next and last process is known as printing; this is effected by allowing light to pass through the negative on to a sheet of sensitized paper. There are a great number of different papers; in some the image appears gradually during exposure; in others, it must be developed by the use of chemicals. Some require a lengthened exposure to sunlight, with others the exposure is a matter of seconds only, and the light may be gas, lamp, candle, or even a match. We now have what is commonly known as a photograph.

There is a further development of printing, known as enlargement, by means of which pictures can be produced larger than the original negative.

I propose first of all to discuss the use of photography in illustrating sketches and reports; I shall then describe briefly how photography has been used, both in France and in the United States, for the production of accurate surveys, and in conclusion I shall mention two other uses to which photography can be put for military purposes, namely, the reproduction of maps, and the reduction of despatches with a view to their transmission by means of pigeons, or concealing them on the body or in the clothing of a disguised messenger.

I should like first to point out that the word reconnaissance does not, as far as my meaning goes, necessarily involve active service; on the contrary, we must remember that in peace-time also a very

large number of reconnaissances are executed, which are more deliberate, and consequently more valuable than those which are executed in time of war.

It is, I believe, laid down in all instructions for reconnaissance, that sketches should always, if possible, be illustrated by drawings in pencil, or pen and ink, and I think it is generally agreed that, particularly in road sketches, these drawings would be of the greatest value in enabling a person using the map to recognize important objects, such as church towers, buildings, cross roads, &c., as such drawings, *if well done*, will convey more to the mind than any map can possibly do. But notice, I say *if well done*. How many of us are there who can draw well enough for this?

It may, perhaps, at first sight appear that the importance of such illustrations attached to sketches has been exaggerated, but I do not think this is the case; I think they might be of the greatest possible value. The fact of an illustration being attached to a sketch or report may just prevent a column losing its way, by enabling the Officer charged with its direction to recognize his whereabouts.

I do not think we can overrate the importance of ensuring that everyone shall be able to find his way. The most masterly combinations of war may be marred by one man taking the wrong road; and a man may very easily do this in a strange country, with indifferent maps and ill-defined roads.

Now I have no wish whatever to disparage the art of landscape drawing, but I should like to point out some of the advantages that would accrue if photography were used for illustrating sketches and reports.

First of all, a very great number of us can never learn to draw, while I say most distinctly that we can all learn to photograph. I do not mean to say that we can all learn to produce works of art, such as I saw at Chatham the other day, but I do say that we can all learn in a very short time to photograph sufficiently well for the purpose we are discussing.

Again, the accuracy of a photograph is very much more certain than the accuracy of a drawing; even those of us who have an artistic talent are very apt to produce pretty pictures, which do not always bear much resemblance to the original.

Again, the time occupied in the field in taking a photograph can usually be measured by seconds, whereas to sketch a landscape entails a halt of some minutes.

Remember also that the plate can be exposed by one man, and developed and printed from by another: the slides containing the plates are always numbered, so that the person who exposes the plates has only to note down the number of the slide he used for each exposure: thus the plates can be sent back to be developed at headquarters, or, while the reconnoitrer is writing out his report, another person can develop and print.

In time of peace, the plates can, if more convenient, be sent or taken back to England for development. When visiting some of the battle-fields in Germany last year, I exposed forty-nine

plates, all of which I brought home, and developed at the Staff College.

Further, when once a photograph has been taken we have the power of reproducing it to any extent, each copy being an absolutely accurate reproduction of the original; this is not the case with drawings.

The man who develops need not have been present when the exposures were made; it is advantageous, but not indispensable, that he should know the exposure given, the stop used, and the amount of light (this information can be easily supplied to him).

As he takes each plate from its slide he marks on it, in pencil, the number of the slide. The photographs can thus be identified.

On the other hand, it must be allowed that photography has certain disadvantages. Chemicals may run short, some officious person may open the dark slide, "just to have a look," and thereby irremediably fog the plate: if glass plates are used they may be broken in transit, or the plates and paper may become injured by the weather, or they may be chemically imperfect; a difficulty may be experienced in finding a place wherein to develop: and a photograph is useless until it has been developed, and a certain amount of time may elapse before that can be done.

But I would point out, that in case of failure from any of these causes, you would be no worse off than if you had not tried to take any photographs at all, for the time spent in the field is not appreciable.

Let us first consider the use of photography for this purpose in peace-time.

As we all know, every great Power has established in some form or other an organization analogous to our Intelligence Department, for the purpose of collecting and compiling information concerning foreign countries, and which is therefore in constant receipt of reports from agents abroad. These reports are the result of reconnaissances executed in time of peace.

I think that consideration will show that in such reconnaissances great use can be made of photography; opportunities will often occur for using larger cameras than can be used when weights have to be kept down, or if only a small camera is used, enlargements may afterwards be made; by means of photography it will often be possible to give a far better idea of the nature and appearance of a country than a written report can possibly give.

Photographs could be taken of important road junctions, easily recognizable points along a route, such as peculiar rocks, trees, &c., entrances to mountain passes, difficult places, also points where rivers are fordable, a dotted line on the print would show the position of the ford, and the route to be followed in crossing the river.

The negatives could be stored, and, in the event of operations taking place in the country, copies could very quickly be printed for distribution. Enlargements could be made when advisable.

The position and appearance of forts can often be admirably shown by means of photographs; enlargements will often bring out a surprising amount of detail.

I cannot, however, recommend photographing forts abroad as a pastime, as it is a practice to which the foreign police have a most rooted objection.

I may mention that I read in the papers a few days ago that two Russian Officers, who have recently ridden from Russia to India, were reported to have taken a large number of photographs during their journey.

I will not dwell upon the apparatus to be used for photographing in peace-time, as the circumstances under which the work is carried on necessarily vary very much. Sometimes large cameras will be used; at other times only the smallest possible amount of gear will be carried.

I will now refer to what I shall call rapid work; where the plates would be developed, and prints taken as quickly as possible, and handed in with the report or sketch the same day.

For this kind of work portability and simplicity of apparatus are the first desiderata.

Let me again point out that we do not want to produce pretty pictures, we merely want to record the appearance of an object so that it shall be easily recognizable from the photograph.

We may utterly disregard such things as yellow stains, hardness, and other troubles so familiar to photographers.

No time need therefore be lost in selecting pretty pieces, nor in "composing" the picture, though of course care is necessary in selecting the view to be photographed.

An exposure can often be made without dismounting, but this requires care, as sometimes the result is a view of the horse's ears. With fast plates the light will not often necessitate a time exposure; even in winter what is commonly called a snap shot is sufficient. I have some photographs here illustrating a road sketch, which were taken on February 17th, on a cloudy day, with no sunshine; but of course this would not have been possible late in the afternoon.

Now as regards the "outfit" for rapid work. As I said before, everything must be extremely simple and portable.

The camera should be of such a size as to be easily carried in the pocket or attached to the saddle; it should be light, and should be strong enough to stand the rough usage of a campaign. The shutter, that is the mechanism for rapidly uncovering the lens, should be inseparably attached to the camera; a "view finder" is indispensable, and it should also be part and parcel of the camera.

It should also be possible to give time as well as instantaneous exposures, and for this purpose the camera should be capable of being placed on legs.

There are now a great number of hand cameras in the market. I have a few specimens here to show the sort of hand cameras that are now being sold; there were notices of 80 in "The Photography Annual," last year.

Another matter is the question of "dark slides," as they are called, that is holders for the plates or films. I have here a variety of plate and film holders.

I shall not enter into the question of lenses, as I think it is rather too scientific a subject for me to touch on to-day. I will only say that the stops should be rotatory, or an "Iris" diaphragm should be used.

As regards plates and films, it is of the greatest importance that these should be specially manufactured to stand extremes of heat and cold. Films have a very great advantage over plates, on account of their extreme lightness and portability.

For development we must have a concentrated developer, one that can be used several times over, and one that will develop prints. Here are some developers of this description that are now in the market.

Very few dishes must be taken; two, I think, would be sufficient, one for developing and one for fixing.

As regards paper, for rapid work I know of nothing like bromide paper. It has two great advantages:—

1. It can be used while the negative is still wet, and when thus used, no printing frame is required.

2. The light used is artificial; therefore, printing can be carried on at night.

The prints would be developed and fixed with the same chemicals that are used for the negatives, the only extra chemical required being the acetic acid for clearing; glacial acetic acid should be carried, as this is very concentrated. Bromide paper requires no toning.

I now come to the question as to how and where the operations of development and printing are to be carried on.

As I said before, the substance, or "emulsion," as it is called, with which the plate or film is coated, is extremely sensitive to light, so sensitive that its exposure to what we call a white light for one-thousandth part of a second will affect it; it is, however, not sensitive to red light: were it not for this, I fancy photography would be impossible. In developing the plate we must, therefore, work by a red light until the operation is completed.

There are several methods by which this can be accomplished. One is to have a "tent," or bag, into which the operator puts his head and arms, and is then tied up, the light being admitted by a red glass window; most of these "tents" are, however, comparatively bulky, and the heat inside them is sometimes insufferable, even in this country; they have this advantage, that development can be carried on anywhere, and in any light; they would also be extremely useful for changing plates.

Another way is to exclude all the light from a room, or tent, if living under canvas, or to wait till night, and work by a lamp with a red glass or shade.

Some form of folding lamp, burning a candle, is what is required. This would be the method employed in Europe, where the reconnoitring Officer could always depend on finding a house with a cellar, and would find a proper dark room in every town; in uncivilized countries, however, this could not be done, and the question is one of considerable difficulty.

The last piece of apparatus I will mention is a bucket full of water.

Where rapidity is essential, negatives can be developed and prints taken off in a very short time. The negatives are only washed for a few minutes, the wet paper is then pressed on to the plate and exposed to the light of a candle or lamp; the prints need only be washed for three or four minutes, this will prevent them losing their colour for several days; a washing of two hours makes them permanent; if the negatives are to be kept for future use, they should be subjected to the usual washing, after the prints that are required immediately have been taken off.¹

A distinguished Officer in my own regiment, Colonel Colvile, C.B., who is unfortunately unable to be present to-day, has sent me some notes on the subject of outfit, which I should like to read to you.

I may add that Colonel Colvile has devoted a great deal of careful study to the subject. He writes as follows:—

“I consider that the camera should be $\frac{1}{4}$ -plate, or lantern-slide size, and be made of aluminium. In order to insure perfectly sharp pictures for enlarging, the picture should be capable of being carefully focussed; but in the ordinary camera this is incompatible with quick hand work; the camera should be double, or should have a movable reflector.

“The *lens* should be a ‘rapid rectilinear’ of about 4-inch focus.

“The *dark slides* should be specially constructed to carry films without the intervention of carriers, and, in my opinion, should be made of cardboard.

“Roll holders are sometimes convenient, but they are more trouble to refill than dark slides, and they are both wasteful and inconvenient if negatives have to be developed as soon as they are taken.

“No really satisfactory shutter has yet been invented, but I believe that the Loman blind shutter (sold by Mawson and Swan) is the best in the market for the purpose under consideration.

“*Field Developing Outfit*.—This should be light, simple, not easily damaged by climate, and arranged so as to work with the least possible amount of discomfort in hot weather, and so as to enable development to be carried on in the brightest sunshine.

“From the fact of their being almost insupportable in the tropics, and ceasing to be light-tight after a little wear and tear, I do not consider any of the developing bags or “tents” at present in the market to be suitable, while from their bulk, developing boxes are equally unsuitable. As cold weather is usually accompanied by long nights, giving ample opportunities for development without special arrangements, it is only necessary to consider a hot-weather outfit.

“*Printing*.—A $\frac{1}{4}$ -plate paper print is almost useless for showing the detail of a country, but a glass, or celluloid transparency, viewed through a magnifying glass, or cast on a screen, will bear a great amount of enlargement, and consequent amplification of detail. I am, therefore, in favour of reproducing all negatives developed in the field on lantern-slide plates or films. For this purpose no addition

¹ During the lecture two previously exposed plates were developed in the cellar of the Institution, and a print taken from each; these operations were completed in *sixteen minutes*.—F. J. D.

need be made to the developing outfit beyond one $\frac{1}{4}$ -plate printing frame.

“*Enlarging.*—Owing to the size of the dishes used and the amount of space required to be kept in darkness, I think enlarging in the field is hardly practicable for an Officer unprovided with special accommodation. In civilized countries it would doubtless be most advantageous if a travelling dark room, in charge of a sapper, were attached to the headquarter office. The photographic results of a reconnaissance could be handed in as soon as taken, and could be reproduced in a few hours, in an enlarged form, for the inspection of the General Officer Commanding. In our small wars, however, this would be impracticable, and in such cases I suggest that the lantern slide I have recommended should be thrown on a piece of paper, say, 20" \times 30", by means of the camera with which the original negative was taken and a small magnesium lamp; this is rather an expensive method of showing lantern pictures, but its convenience makes it by far the most suitable.”¹

Balloon Photography.

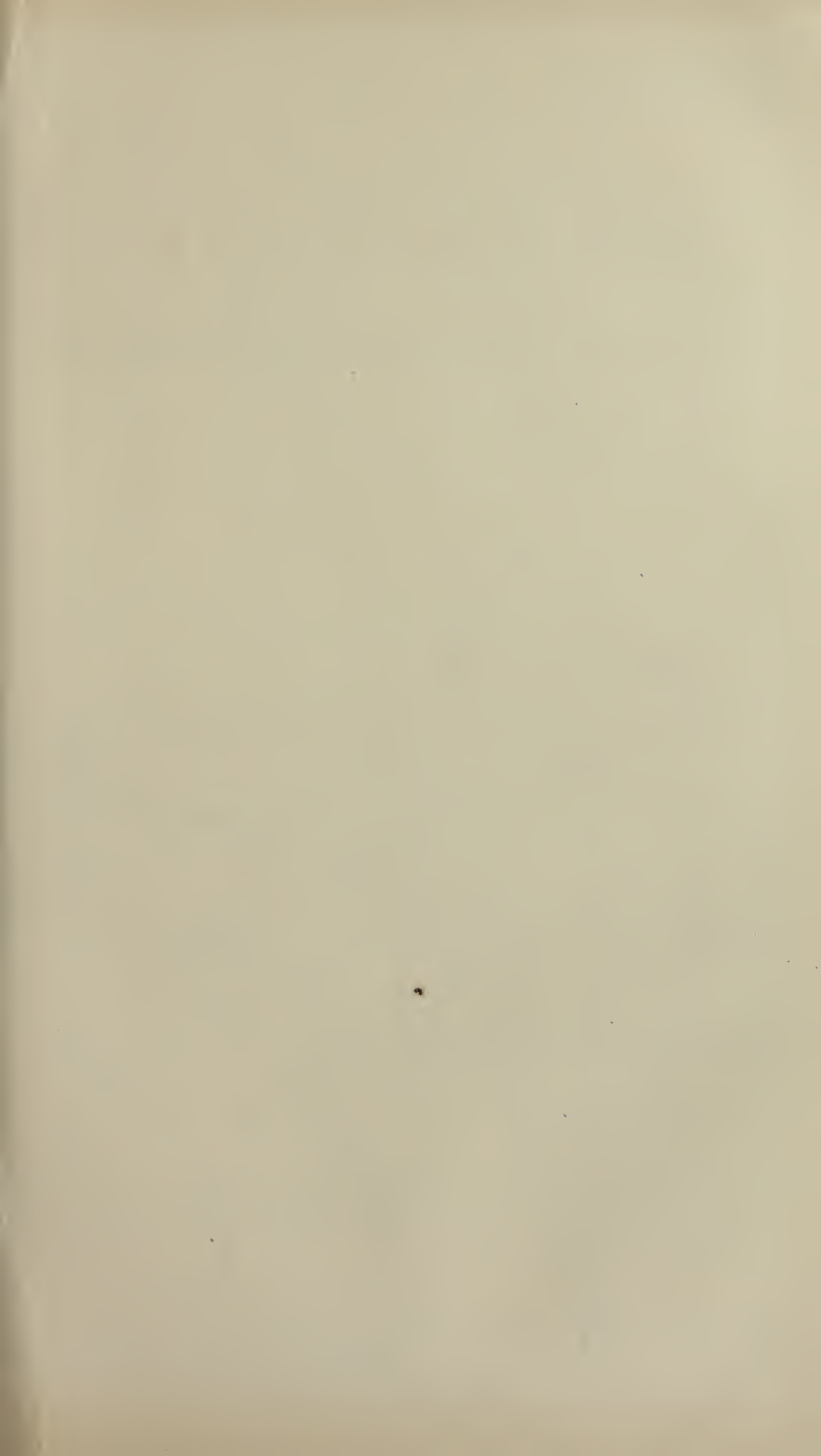
The use of balloons in war affords another opportunity for using photography in reconnaissance. Several attempts have been made from time to time to develop balloon photography, and special cameras have been devised for this purpose.

It has been proposed that balloon photography should be used in sieges by the besiegers. One plan is to start a small balloon, loaded with a camera, but without an aeronaut, to windward of the fortress, the plates being exposed by means of a clockwork arrangement, or a slow match, the time which would elapse before the balloon will reach the point or points where the exposures are to be made being estimated beforehand. As the gas gradually escapes, the balloon descends on the further side of the fortress within the besiegers' lines.

Lieutenant Reed gives an instance of the practical use of balloon photography in war.

While besieging Richmond the Federals employed a balloon to reconnoitre the enemy's positions. From this balloon a photograph was taken on a single plate of all the country between Richmond and Manchester, on the west, and the Chickahominy on the east; the rivers, smaller streams, railroads, marshes, pine woods, &c., were all represented, as well as the dispositions of the troops. Two prints were made, one of which was retained by the Army Commander, and the other by the aeronaut; rectangles were ruled on the prints, the same on each, reference letters being attached, and since in subsequent events telegraphic communication was established between the balloon and headquarters, the aeronaut was able to give information of any important events that occurred in any rectangle, which information in several instances proved of great value.

¹ Colonel Colville is bringing out a campaigning camera and a dark slide, both of which were exhibited and explained to the audience.—F. J. D.



Surveying by Photography.

I will now briefly describe how photography has been used as a means for obtaining the data for the execution of an accurate survey.

For the greater part of my information on this subject I am indebted to Lieutenant Henry A. Reed, U.S. Army, who has kindly allowed me to make full use of his work on the subject, called "Photography Applied to Surveying." The method is by no means new. As much as thirty years ago, Colonel Laussedat and Captain Javary, of the French Army, made surveys near Paris and Grenoble on the principle I am about to explain. I may mention that, as regards accuracy, one of these agreed exactly with the Government survey, while in the other the differences of level as compared with the regular survey nowhere exceeded 19 inches.

The method relies upon the application of the principles of plane perspective.

If we wish to obtain the view of an object in perspective, we start from two projections as data, viz.: the vertical projection and the horizontal projection. In applying the method I am about to describe we work back from the perspective view, *i.e.*, the photograph, to the two above-mentioned projections.

It would be as well to define certain terms used in perspective.

In Fig. 1 the picture *V* represents the distant typographical features as shown: the hills *A* and *B*, and the church *C*, being shown in perspective. *O* is the eye of the observer or "station point;" *P* is the point in which a visual ray, perpendicular to *V*, pierces it, and is called the "point of sight;" the line *HH* is the "horizon of the picture;" it is the intersection with *V* of the observer's horizon; the points where straight lines joining the distant objects with *O* pierce *V* are the perspective of those points.¹

Now, if the different points of a landscape and the visual rays intersecting them be vertically projected into the plane of the horizon, the angles included by the projections are the true horizontal angles, the same as would be measured by a theodolite.

Since the positions of *HH* and *P*, and the distance *OP*, are always known, it follows that if *V* be laid on a flat surface (see Fig. 2), and *PO* be set off perpendicular to *HH*, and *a* and *b* be vertically projected into *HH*, at *a'* and *b'*, then the horizontal angle between *a* and *b* will be included by the straight lines joining these projections with *O*; in other words, the angle *a'Ob'* will be the angle subtended at the observer's eye by the two hills *A* and *B*.

I will now explain how these principles apply directly to photographs. In Fig. 3 *V* and *V'* represent respectively the position of a photograph and a perspective drawing with regard to the "station point;" as regards *V'*, the point *O* represents the observer's eye; as regards *V*, the photograph, *O* represents the "optical centre," which is the point where the rays cross.

¹ These are the terms used in most English books on Perspective. Lieutenant Reed employs slightly different terms.—F. J. D.

V and V' are vertical, parallel, equidistant from O , and the straight POP' pierces each at its middle point, and since any point D is projected by the same visual ray at d and d' , which are equidistant from the middle points of V and V' respectively, it follows that the two views are similar.

I will now give an outline of the working of the method.

A base is chosen, measured, and its magnetic bearing observed, as in ordinary surveying: from each end of the base a series of photographs of the ground to be surveyed are taken; for each exposure the camera must be carefully levelled, and the magnetic bearing of the axis of the lens observed and recorded. By a mechanical arrangement in the camera the horizon line, and a vertical line representing the vertical plane containing the axis of the lens, are marked on the negative, and consequently appear on the print; the point where these two lines cross is what is called in perspective the "point of sight," P (Fig. 2).

The "focal length" of a lens can always be ascertained; this is the equivalent of the distance OP .

Let us take a simple case as an example: suppose that we have taken one photograph from each end of the base, and that on each there is a representation of two hill tops, the position of which we wish to fix in plan. As we know the length and bearing of the base, it is clear that to fix these points we have only to ascertain their bearing from each end of the base.

We next proceed as follows: on each photograph we draw perpendiculars from the representations of the two hill tops to the horizon line (Fig. 2). We then plot the base on the paper in the usual manner (Fig. 4), and from each end of the base we draw a line, having the bearing recorded in each instance as the bearing of the axis of the lens, making each of these lines equal in length to the "focal length" of the lens; at the ends of these lines furthest from the base, draw lines at right angles, to represent the horizon lines; the ends of the base will be the "station points," and the points where the lines from the end of the base meet the horizon lines will be the "points of sight."

We now measure on the photograph the distance from P (Fig. 2) to the points a' and b' , where the several perpendiculars from the objects fall on the horizon line, and mark off similar distances from the "principal point" on the horizon line on the paper; if we join the end of the base with the points so marked on the horizon lines, we shall be drawing the bearing of the objects from each end of the base, and shall thus be able to fix their relative positions by intersection.

Having fixed the positions of A and B in plan, we must ascertain their height with regard to the datum level, viz., the observer's horizon.

In Fig. 5 OA' is the distance from the point at which the view was taken to the object; Oa' and $a'a$ are the distances from O to a' and a to a' (see Fig. 2). AA' will be equal to the height of A above the observer's horizon; it is clear that the triangles $Oa'a$ and $OA'A$ are

similar triangles; therefore, as we know the lengths of Oa' and aa' and of OA' , we can find the length of AA' by trigonometry, arithmetic, or construction: for instance, we wish to find the height of A above the observer's horizon. We measure Oa' and aa' on the print (Fig. 2), and find them to be 10 inches and $\frac{1}{2}$ inch respectively; measuring on the plot, we find A to be 600 yards from O ; to ascertain the value of AA' we have a simple proportion sum—

$$10 \text{ inches} : 600 \text{ yards} :: \frac{1}{2} \text{ inch} : x;$$

$$\begin{aligned} \therefore x &= \frac{600}{10 \times 2} \\ &= 30 \text{ yards,} \\ &= 90 \text{ feet.} \end{aligned}$$

The above description is merely an outline of the way in which the survey is carried out.

As regards rapidity of execution, Lieutenant Reed states that M. Javary, a French Engineer Officer, once made, in six hours, a complete photographic survey of a zone three-quarters of a mile in width in front of a fortified place; and, after eight hours expended in plotting, presented the Commanding Officer of the attacking force with an exact and complete map, including the levelling; this in rainy weather, and with the old-fashioned wet plates.

A writer in the "Entrétiens Militaires de la Réunion des Officiers," in 1872, states that with four trained operators a plan can be made of any fortress, except Paris, in 24 hours.

Lieutenant Reed claims the following advantages for photographic surveying: an entire tour of the horizon, or any desired part thereof, is obtained in a few minutes by a series of very simple operations, involving no multiplied nor fatiguing observations, no drawing sketches or lines of direction difficult to trace in the field, no delicate pointings nor minute readings, and no prolonged observations. There is no fear of having forgotten or omitted some important point, because every visible detail is represented; the office work presents no difficulties; all the work done in the field is of value; and, the map finished, the photographs as addenda present a view as comprehensive as if the observer had personally traversed and inspected the tract surveyed.

I understand that whenever this system has been tried in England it has proved a failure; still I cannot but think that it might be of use in open countries, particularly in siege warfare. It would also seem that photographs would be valuable additions to the range tables, as facilitating the identification of the points named in the tables.

Reproducing Maps.

As regards the copying of maps, I shall not enter into details. I will only point out that if it is necessary to reproduce a few copies of a sketch at short notice these can be easily obtained by photography. The original sketch is photographed, and prints taken off in the usual

manner; if, as will often happen, the exposure has to be made at night, magnesium wire will replace the light of the sun; such work would, I imagine, be handed over to the R.E. photographic detachment.

Reduction of Despatches.

A short account of the use made of photography in the reduction of despatches for transmission by pigeon during the war of 1870—71 may be interesting.

My information is derived from "La Pigeon Messenger," by La Perre de Roo; "Les Télégraphes et les Postes pendant la Guerre de 1870," by M. Steenackers, who was at the time at the head of the French Post Office; and from a lecture delivered at the Camera Club, three years ago, by Captain Mantell, R.E.

A regular service of pigeons was established between Tours, which was the seat of the Government of the National Defence, and the capital, and afterwards from Bordeaux. The weight which a pigeon can carry is of course very small, if therefore the despatch were written, or even printed, very little information could be sent by one pigeon; recourse was therefore had to photography, in order to reduce the size of the despatches.

The despatches were first printed on a sheet of paper containing about 300,000 letters; this was reduced to a negative about $\frac{1}{300}$ th of the original, and then printed on a film of collodion. About twenty such films could be carried in a quill by one pigeon, containing, according to Captain Mantell's estimate, some two or three million letters, or the equivalent of sixty ordinary newspapers, the whole weighing only 15 grains.

On arriving in Paris, enlargements were made by means of the photo-electric microscope.

This last part of my lecture is rather outside my subject; I have mentioned it as a matter of general interest, and as another instance of the use of photography.

In conclusion, ladies and gentlemen, let me say that I do not wish you to picture to yourselves an advancing army preceded by a cloud of Staff Officers armed with "Kodaks," like a lot of tourists; my object has been to bring military photography to your notice, with a view to raising a discussion on its merits and possibilities. I think that it has a future, and that it is worth our while considering, how far it may be of use in helping us to attain that great object of all military movements, namely, to get to the right place at the right time.

Lieut.-Colonel EVERETT (Professor of Military Topography, Staff College): I hardly think I am the proper person to commence a discussion on the very interesting lecture that has been given us, because I hold so strongly the views of the lecturer on the subject. Under these circumstances, I should have rather preferred to reply to someone who might have taken the opposite view. Perhaps, though, that would be difficult, because I feel almost certain that everyone here who has listened to the lecturer must agree with the views that he has expressed, or, at all events, with most of them. I think the main

question involved in his lecture is, whether photography could be made use of by Staff Officers reconnoitring in the field, or, in other words, whether photography would not be better than landscape drawings executed with pen or pencil? That question can hardly be answered until we have replied to another, viz., Are illustrations of any kind useful in reconnaissance? There are some men who hold the opposite view. For myself, I believe them to be most useful accessories—I mean ordinary sketches—and, indeed, I do not consider a reconnaissance to be complete unless sketches are sent in with them. The very best report fails to convey to the mind an accurate impression of the nature of the ground described, and any impression is only gained after a great deal of trouble; whereas a single glance at a good sketch makes the whole thing perfectly clear to the Officer for whose benefit the work has been done. Therefore I think we may say that sketches *are* certainly most useful. And now comes in the question: “Are photographs better than sketches?” I have had some experience in the work. I have been employed on long reconnaissances, lasting sometimes for weeks, and even for months, and I may say from that experience that, in the first place, the preparation of landscape drawings is often very tiring work, and, sometimes, very cold work. You may see something most interesting that you want to draw. You may have been working all day: you feel a bit tired, and, perhaps, cold too; you do not care to sit down; you pass on, and the subject is gone for ever. But if you have your camera the work is done in a moment, and you ride away, rejoicing. Now, I think that is a very great advantage. Mr. Davies has said that all of us cannot learn to draw. I think a good many here will say he is perfectly right; but I will go further. From the experience which I have had at the Staff College, I have come to the conclusion that photographs are better than the best sketches that can be made; and I have come to that conclusion by comparing them with the photographs. Let us take a bridge for example. You want the details of that bridge; you want to know all about it. It may have to be destroyed, and you want to know how to do it. Well, take a sketch: take a number of sketches: none of them are alike, and none of them give an accurate representation of the bridge; and the worst of it is that, the better the artist, the greater is the dissemblance. Well, gentlemen, we are all like that; we like to idealize a little bit if we can use the brush or pencil. But with the photograph we have a check on us, we cannot do anything of the sort, and therefore the photograph gives us invariably—what the sketch does not—the truth. I should like to say one word as to what Lieutenant Davies has told us with respect to the ease of it all. That the actual operation of taking the photograph is easy you can clearly see. As regards the development at night, there is an album on that table with some photographs which I have taken myself, and I may tell you that most of them were developed in tents, very often with very indifferent water. Some have been developed under moonlight. True, the tent had a dark-blue lining, but still I could see the moon through it; yet there was no danger to the photograph, *i.e.*, the negatives were not fogged: therefore, you will observe, that development can be done in a tent, and I think that this is an important fact. As regards rapidity of development and printing, I may mention that at the Staff College, a year or two ago, we had a distinguished photographer. He was working with Eastman bromide paper, a paper you can print with by candle-light very rapidly. He was timed, and he developed and printed six bromide prints in *half an hour*. I think that fact is very valuable, from a military point of view also. As regards the feasibility of development in war-time, possibly it might not always be feasible, but it would not be reasonable to condemn a process because now and again it could not be conducted. I say it might not always be feasible, but it might very often. On the whole, therefore, gentlemen, I am inclined to think that photography is, indeed, a valuable—most valuable—adjunct in reconnaissance work, and that perhaps it has been neglected almost too long. At the Staff College I am glad to tell you that we have got a number of photographers, of whom Lieutenant Davies was, till lately, one of our most distinguished; in fact, out of the sixty-five men now at the college, we have twenty-six who are either photographers or on the way to become so. Not only for reconnaissance, but in many other ways, as the lecturer has informed us, photography is of use; and, indeed, I am inclined to think that even for describing

the position of troops in action, and the formation employed at certain periods, photography would come in and assist in setting at rest many vexed questions which are often discussed after a campaign, and never satisfactorily settled. I may tell you I have seen a photograph by a man of a bear which he shot a few seconds afterwards; and I think it illustrates what may be done in moments of extreme excitement with a camera and a little coolness. I must apologize for having taken up so much time, but my feelings on the subject are, as I mentioned at the outset, strong, and I fear I may have let them run away with me.

General Sir C. P. BEAUCHAMP WALKER, K.C.B.: I entirely concur as to the very interesting lecture we have had. I know the very large extent to which photography was made use of by the French during the siege of Paris, because all the letters that were sent out by balloons were photographed, and of course the number of letters carried by balloon was something enormous. As Mr. Davies has already said, we shall very probably have a very considerable illustration of this from Mr. Tegetmeier, who is going to give us a lecture on pigeons. I have no doubt he will mention the capacity of pigeons, as has been detailed by Mr. Davies. I very much admire the lecture.

Captain LEITH TOMKINS: Perhaps the lecturer will kindly give us some of the difficulties. He has given us an account of the successful results which we have been very pleased to hear; but I think if he would tell us some of the difficulties he has met with, and how he has got over them, it would be of great interest. With regard to apparatus, choice of camera, and so on, no doubt he has tried several before he finally decided which would suit his purpose best.

Lieutenant DAVIES: I thank you very much for the kind way in which my lecture has been received, especially for the kind way in which Colonel Everett has spoken on the subject. With regard to difficulties, I may say that I have here on the table the result of every plate I ever exposed in photography on reconnaissance. They may all be seen, and I do not think I ever had a failure in any of them. I had a few failures abroad because some of the boxes in which they were packed were not strong enough; they came to pieces. The weather was the worst I had ever seen in my life. We had nothing but blizzards all day long. Here is a specimen of a photograph taken in a blinding snow storm. Everybody thought it was perfectly absurd my exposing a plate. I had nine failures in all out of forty-nine, principally owing to the box having been broken and light having got in. As regards cameras, I cannot say I have tried a great number. I have only used one kind for this particular work, and that is a camera made by Messrs. Shew, called the "Eclipse" camera. I cannot profess to have here specimens of every kind of camera, but I have brought a few to show you how portable the apparatus now is.

The CHAIRMAN (Sir Robert Biddulph): Gentlemen, I think we may very fairly judge from the total absence of hostile comment of any sort or kind on the lecture, that the meeting is entirely unanimous in agreeing with the lecturer and with what Colonel Everett has said as to the value of photography in connection with reconnaissance. In fact, I think it is a matter which admits of no dispute. Any one who has had any experience of looking at either sketches or landscape drawing will agree that the accuracy and clearness of photographs renders them a great aid in appreciating the actual lie of the country on the situation. I agree especially with what Colonel Everett said as to the importance of getting accurate details. I am quite certain, as he said, that when you come to make a drawing of a building or bridge or anything of the sort, that there are many details necessarily omitted which the photograph represents, either immediately visible or which are made visible by magnifying. The advantage of using photography in peace-time, as alluded to by the lecturer, cannot be overrated, and I am sure that in the case of gentlemen travelling in distant countries, more especially those countries which might become the theatre of war, such as those on the outskirts of India, which are liable at any time to become the theatre of active operations for our troops, it would be of the very greatest advantage to have exact representations of the different places which they visit, and these may very often be found, in the most unexpected way, to be most valuable. As regards active operations, it seems to me that there is one special occasion which has been already alluded to, in which

it is most valuable, that is in the conduct of a siege. I cannot imagine, in modern days, anything more valuable than being able, say from a captive balloon, to take exact photographs of those parts of the positions of the besieged which are not otherwise visible, and the ability also to observe the effect of the fire of the batteries. The science of the besieger's fire has advanced to limits beyond anything of which we had any idea in the days of the siege of Sebastopol. I am alluding to the siege of Strasburg in 1870, where breaches were made from invisible batteries. In that case those working the batteries could have had no means of judging of the effect of their fire. They could very well have judged that effect from the view taken from a captive balloon; and, of course, if it were photographed and brought down accurately to the General Officer in command, he could rectify any defect which had been made in the firing. I merely mention that as an illustration. The use of photography in the field is a matter of quite modern practice; but there is one example alluded to by the lecturer which I think perhaps Sir Beauchamp Walker will remember, in which it was of very great value in the old days, and that was in the China War of 1860. We had the very greatest difficulty in knowing what was the actual state of Peking. No map was in our possession. The Russian Legation had secretly prepared a map a few months before, which they had done in a very expert way to avoid the jealousy of the Chinese. They had sent an Officer in a small covered cart, such as they use to carry their women about, completely covered in. An indicator was attached to the wheel. He drove for a certain distance, to a certain cross-road we will say, and then he took a shot with his instrument: then down the next road, and travelled along that, and in that way he made a complete plan of the City of Peking, with all its streets and roads, both in the Tartar city and the Chinese city. They were anxious to show their good will to us, and General Ignatieff, who produced this map, offered its use to the English. We had no photographers in the Royal Engineers then, or attached to the Army; but there was an Italian gentleman who had followed the Army for his own private purposes with a view of producing photographs to sell to the public, and he was set to work to reproduce this map. He produced a sufficient number of copies for our requirements, and they were extremely serviceable. Had it been necessary to storm the place, that map would have been extremely useful for the purpose of rescuing the prisoners who were known to be in a certain place in the city; so that, if it had been necessary to storm Peking, a party would have been immediately detached to rescue the prisoners before any harm came to them. That is the only illustration I can give you of anything of which I have any personal knowledge. As regards the reduction of despatches, the lecturer did not tell us, what, I think, is a most interesting illustration of that. I remember well, in 1870, the French in Paris and their friends outside had very great difficulty in communicating, and it became a regular practice for persons who wished to communicate with their friends in Paris to have those communications printed on the first sheet of the "Times." I am sure some present will remember what an extraordinary appearance the first sheet of the "Times" used to present in those days, full of all sorts of private letters. They were afterwards photographed and reduced, and sent in under a pigeon's wing. When they arrived in Paris they were reproduced in large sheets and stuck up in public places, and everybody who expected a message from his friends went and studied this sheet to see if he could find it. That, I think, was a very interesting illustration of the reduction of despatches and their reproduction afterwards. And, of course, not only private despatches but public news also was conveyed in that way—news which the people inside Paris could not otherwise have got. I think, judging from your unanimity, I need not do any more than to ask you to allow me to convey your thanks to the lecturer for the very interesting manner in which he has brought this subject before us.

MODERN RIFLE BULLETS AND THEIR EFFECTS.

By Brigade Surgeon Lieutenant-Colonel C. H. Y. Godwin, Professor
of Military Surgery, Army Medical School.

IN a paper on "Magazine Rifles in War" published in the Journal of the Royal United Service Institution for the month of November last, the author writes: "We endeavour merely to disable our enemies individually and collectively, but the disabilities inflicted should, under the circumstances, be at least grave enough to prevent the injured from taking any further part in the campaign;" and the argument of the paper, if I rightly understand it, is that the bullet of the Magazine rifle has been so reduced in weight and size that, judging from the two cases reported, it will be inefficient to check men opposed to us in any future war, and also, if they are wounded, the nature of their wounds will be so slight as to scarcely render them ineffective for longer than a few weeks.

I propose to bring forward in reply a series of experiments that have been made in France with the Lebel rifle as against the Gras, as they are very comparable with the two military rifles at present in use in this country, namely, the Martini-Henry and the Lee-Metford or Magazine rifle.

	Bore.	Weight of bullet.	Muzzle velocity.	Rate of spiral.
Martini-Henry	0·450	410 grs.	1,362	1 in 22
Magazine	0·303	217 „	1,850	1 „ 10
Gras 11 mm. or	0·433	386 „	1,493	1 „ 22
Lebel 8 mm. or	0·315	231 „	2,000	1 „ 9·4

The Martini-Henry and the Gras bullet is a solid one of lead, hardened with tin and antimony respectively.

The Magazine bullet has a core of lead hardened by antimony encased in a cupro-nickel envelope.

The Lebel bullet has a core of lead encased in an envelope of mallechort.

The extracts quoted below are taken from a paper published in the "Archives de Médecine et de Pharmacie Militaires" for the month of February, 1891, and headed "A Study of the Comparative Effects produced by the Bullet of the Gras Rifle 11 mm. in diameter, and of the Lebel Rifle 8 mm. in diameter; by M. M. Delorme, Professor of Surgery, Val de Grace, and M. Chavasse, Assistant Professor of Surgery, Val de Grace."

Experiments with the Gras and Lebel Rifle in France.

In a paper read before the Academy on 29th May, 1888, the authors, after a series of experiments most carefully conducted, reviewed the lesions produced by the bullet of the Lebel rifle, and came to the conclusion that the type of fractures caused by this small-bored rifle 8 mm. (0·315 inch) were, with some slight differences, almost the same as those that had already been described as caused by the Gras rifle 11 mm. (0·43 inch). Since then a further series of experiments have been conducted, and the effects produced by the two bullets have been compared—

1st. By firing the bullets at equal ranges.

2nd. By firing the bullets so that they should possess the same velocity at the moment of impact, which of course was only possible at very dissimilar ranges, owing to their different initial velocities.

The authors state that a condition of the first importance with respect to the value of the results was to fire at exactly similar parts of the limbs and of the bones of one subject, and, notwithstanding all their previous experiments, they have only taken account in the present paper of the occasions where the conditions in each case were absolutely fulfilled; they add, it is not any exaggeration to say that the results obtained present a high degree of accuracy.

Impact.—The shock impressed by the force of the projectile on a fractured limb was always shown to be much more considerable with the leaden bullet of the Gras rifle 11 mm. than with that of the Lebel rifle 8 mm., whatever might have been the distance, the velocity, or the points of bone fractured. The difference, however, was infinitely less marked, almost absent, in fact, when the soft parts alone were traversed. This fact was especially remarkable in firing from such ranges as 400 metres, and at certain bones, as the humerus or femur. These long bones, when struck by a Lebel bullet 8 mm. at ranges such as 300 or 400 metres, did not seem to have received a sufficient shock to lead the surgeons to believe that there was a fracture, which was discoverable only after a direct and close examination; whereas, when the bullet was from the Gras rifle 11 mm. the fracture could always be recognized at once by the oscillation of the limb. This absence of shock in limbs struck by the Lebel bullet appeared to be due to the greater power of penetration, to its smaller diameter, and to its preserving its shape unaltered.

The authors conclude from these experiments that the general shock, as well as the local shock, will be less with these new enveloped projectiles, especially when fired at distances over 400 metres.

Explosive Effects.—The bullets of the Lebel rifle 8 mm., as also those of the Gras 11 mm., produced, at distances relatively short, effects on the tissues which have been termed *explosive*. Under ranges of 300 metres, especially at ranges of 200 metres, with the Lebel rifle explosive effects were observed in wounds of the skin and muscles; the muscular tracks were very large, sometimes enormous, whether the bones were fractured or not. Indeed, with both the Gras and the Lebel rifle bullets, when they met a long bone capable of offering;

some resistance, the lesions were so much the more considerable according as the velocity was greater; in a word, the shock, the destruction of the soft parts, and the comminution of bone increase with the velocity. With the Lebel bullet these effects were obtained almost regularly up to ranges of 280 metres, and sometimes in ranges of 300 and 320 metres, when the bullets encountered a hard resisting bone. With the Gras rifle 11 mm. such injuries were not produced much beyond 100 or 150 metres.

Examples of the so-called explosive effects are illustrated by the following experiments:—

Experiment I.—Gunshot wound from a Lebel rifle at 280 metres. The bullet hollowed out deeply the middle part of the right tibia, near its internal border a little obliquely. The wound of entrance had a diameter of 10 mm.; the wound of exit looked like a longitudinal bursting open of the skin 11 cm. in length, through which the muscles protruded; the fracture was very comminuted.

The gunshot wound of the Gras rifle at the same range produced a large hollowing out of the middle part of the left tibia, in all respects comparable in type to the preceding one, with detached splinters from the posterior face of the bone; moreover, a single fissure of 0.13 mm. in breadth split the external face of the bone. The wound of exit of this bullet had only the dimensions of the index finger. The lesion was grave, but it did not present by any means the degree of attrition, the extensiveness, or the comminution of the preceding injury.

Experiment II.—Gunshot wound of the middle part of the right thigh by a Lebel bullet at 280 metres. Fracture very comminuted of the femur, wound of entrance measured the same in diameter as the bullet, wound of exit was as broad and as long as the hand. The Gras rifle bullet only made a wound of exit on the opposite limb of the size of the top of the thumb, at the same range. The seat of fracture was, like the preceding one, 8 cm. in extent, but it was a less clean one than the other, although the amount of splintering was about the same. Fissures in the ends of the bone extended up for 6 cm., but none were found in the right femur.

Experiment III.—In a third case, a gunshot wound of the middle part of the thigh due to a Lebel rifle bullet at a range of 320 metres, the following lesions were noted, which were very remarkable. At the side of the wound of entrance, which was clean and regular, and scarcely larger in diameter than the bullet, was a tear through the skin 0.12 metre in length, widely gaping, through which the mangled muscles could be seen. The vessels, apparently intact, but bruised, crossed the cavity. The wound of exit looked like a large square chasm 14 cm. in length, of tattered flesh held together in part by some filaments of the sciatic nerve. There was a clean fracture of the femur, with a loss of substance 9 cm. in length between the ends of the bone, which were not fissured. Such an injury as this had never been met with, the authors say, at such a range with the Gras rifle.

These kinds of injury explain what is meant by the explosive

effect of a solid bullet; it is just as if the wound had been made by an explosive bullet.

On the spongy and articular ends of the long bones, the destructive effects of the Lebel rifle at ranges of 200 and 280 metres were sensibly less than those of the Gras, but at closer ranges the effects of the two rifles were very similar and very severe.

To repeat, up to 100 metres, the two rifles produced occasionally the same kind of explosive effects. From 100 to 200 metres, the Lebel rifle continued to produce wounds of this kind when striking the shaft of a long bone, but at other ranges in the case of joints the Gras rifle was the more destructive.

From these experiments one fact is evident, that the severity of the injury is in direct proportion to the velocity of the projectile, and the amount of resistance it meets with. The Lebel rifle bullet presents a marked inferiority to the Gras rifle bullet, which is so easily altered in shape, when we consider its weight and the little tendency it has to become deformed.

At 1,600 metres, the Lebel bullet made a wound of entrance no larger than its own base, while at short ranges, both bullets made openings in the skin as large as the tip of the little finger. The wounds of exit in the case of both bullets when they had only passed through the soft parts presented no peculiarities.

Injuries to the Shafts (Diaphyses) of Long Bones.

The lesions produced on the shafts of the long bones by bullets possessing the velocity of the Lebel rifle for ranges up to 280 or 300 metres, and up to 100 or 150 metres for the Gras rifle, have been noticed under the heading of explosive effects.

At ranges from 300 to 800 metres.—The lesions of compact bone caused by either bullet were always most serious, but became less so as the range increased. The size of the splinters of bone increased, while the pulverization and scattering of the fragments of bone diminished, with the distance. The general characters, however, of the wounds caused by the two bullets were much alike, but with some differences.

The Lebel rifle bullet, on striking compact bone at these ranges, produced a pulverization, or a great shivering into pieces of the compact bone which were scattered with force in all directions. Of these particles of bone, some were free, and others remained adherent to periosteum; nothing like this was seen with the Gras rifle.

It often happened that fissures extending from the seat of fracture were less extended in the case of the Lebel bullet than in the case of the Gras. At these distances, however, the differences of action of the two bullets did not appear to be of great importance.

From 800 to 1,200 metres.—The Lebel bullet caused a less amount of comminution of bone than the Gras; there were fewer loose splinters of bone, and the extent of the fissuring was less; hence, the fractures of the Lebel bullet were, at this distance, less severe than those of the Gras.

Beyond 1,200 metres.—The Lebel rifle bullet appeared to produce more comminution of bone than the Gras; fractures of this kind were met with up to 1,500 and 1,800 metres.

Effects upon Joints (Epiphyses).

In the case of wounds of joints (epiphyses) beyond the range of 300 metres, the effects of the two bullets were very much of the same character, except that, owing to the difference in size and the maintenance of its proper shape, the Lebel bullet did not force so widely asunder the fragments of the articular ends of the bones.

Results obtained for the two Bullets with equal Velocities.

Some experiments were made with the two bullets when possessing the same velocities; to do this the range of the Gras rifle had to be lessened and that of the Lebel increased.

In these experiments the lesions produced by the Lebel rifle were less grave than those of the Gras; the general character of the types of fracture, however, varied but little.

In the case of the smaller and enveloped bullet there was a less-marked lateral displacement of the splinters attached to periosteum, and the loose, or nearly loose, splinters were not so forced into the surrounding muscular tissues. On the other hand, the Lebel bullet, with its great and mean velocities, was attended with more crushing or pulverization of the more compact bone at the wound of entrance, and with a greater breaking into small pieces of the loose splinters.

The differences observed in the two series of experiments are easily explained, the authors say. In firing with equal velocities, the weight and size of the Lebel bullet accounts for the less severe kind of lesions; but, at equal distances, this deficiency of weight and diameter is compensated for by the increase of velocity.

MM. Delorme's and Chavasse's Conclusions.

The writers of the paper, in their conclusions, say that the new projectile (the Lebel), owing to its increased velocity, possesses a greater power of penetration. It, in common with the Gras rifle bullet, at short distances produces explosive effects; between 300 and 800 metres the differences in effect are only of a slight character; both inflict very severe wounds; at 800 to 1,200 metres, owing to its small size and regular shape, it does not cause such severe injuries on bones as the leaden bullet of 11 mm., which so readily undergoes changes of shape, but thereby loses some of its force. Beyond 1,200 metres the bullet of the Lebel causes more comminution in the fractures it produces than that of the Gras rifle.

On the epiphyses and short bones, fractures and perforations of the same type and character are made by both bullets, but the smaller one causes generally less extended and less widely separated fissures,

the splinters from it are smaller and less broken up, and simple perforations are more often met with. In short, the wounds of joints by the Lebel rifle bullet are in general less comminuted and less severe.

If the envelope of the Lebel bullet broke, lead and possibly the deformed and empty case will be retained in the track.

Both bullets often carried in with them pieces of clothing.

Professors Chauvel and Nimier, of the Val de Grace, who have also made many experiments, do not altogether agree with the above conclusions, and are not inclined to give the Lebel rifle credit for more than an increased range with a consequent increase of penetrative power, which is in part due to the hard envelope, which does not usually undergo any change of shape.

Results of Experiments in this Country.

In some experiments carried out in this country with the Magazine rifle, a series of shots with the Metford bullet 0.303 were fired at the carcasses of horses at short ranges, viz., 100 yards. In all these instances, the so-called explosive effects upon tissues, whether hard or soft, were most marked, the bones were frightfully shattered, and the splinters and particles of bone were scattered far and wide in amongst the surrounding pulped muscles. In several instances, the envelope of the bullet had yielded when striking some hard resisting part of bone; the lead had then escaped, leaving an empty doubled-up case in the track. In such a case crushed bone and particles of lead were found in the pulped muscle. Unfortunately, no experiments were made at longer ranges. At the distance, however, of 100 yards hard compact bone was split into pieces, joint ends of bone were completely smashed, and such injuries were inflicted as would have been of the gravest character. Since these experiments were made, the cupronickel envelope of the bullet has been strengthened, and is consequently less liable to yield; the charge used was the ordinary service charge of compressed powder, and, in some instances, cordite or smokeless powder.

Conclusion.

In estimating the power of such rifles on the human body for purposes of warfare I do not think the wild game theory quite comparable. The sportsman's object is to bag his game; hence, in dealing with fierce animals, he must so stun them, if they are not killed outright, that they cannot offer any more resistance; again, in the case of deer, &c., it is well known that breaking the leg only is tantamount to losing the animal, unless a second shot is more successful. In fighting with Western nations there is very little fight left in a man once wounded by a rifle bullet; other reasons come into play; though there may be but little shock, the tendency of men when hit

is to fall out. Against some Eastern nations, especially when fanaticism exists, doubtless a stopping power is a *désideratum*.

It seems to me that some other lessons are to be learnt from the so-called Aldershot case referred to at length in the paper published in the November number of the United Service Institution Journal. The man was hit at a distance of 1 mile behind the 800 yards range, or at a range of 2,500 yards, by a bullet which, after encountering two ricochets and traversing 2,500 yards, had still sufficient energy to go right through the thick of a man's thigh, and bury itself afterwards in the ground.

If one may be allowed to conjecture, it is only fair to say that supposing the bullet had struck his chest or abdomen, it would have penetrated, if not perforated, these cavities, and so probably have caused the man's death; or, again, if the bullet had struck a joint, it would undoubtedly have split the bones forming it. At this distance of 2,500 yards would the Martini-Henry rifle have been able to touch him, and, if so, could it have caused more harm than a slight contusion without any breach of surface? Yet this small bullet, 0·303, not only hit the man but perforated his thigh, and, as the chance was, it merely created a slight flesh wound, whereas, if it had struck him in a vital part, it was quite capable of causing his death, or some serious injury to bone or joint that would have been the cause of a lengthened illness.

My object, however, is not to criticize, but to bring forward some experimental results, which, in my opinion, go far to prove that not only will a greater number of wounded fill our hospitals in the future, but that the character of the wounds produced by these small enveloped bullets are likely to be of a nature that will try the Surgeon to the utmost, and will not be conducive to the soldier's speedy return to a military life.

FOREIGN SECTION.

THIS portion of the Number, hitherto the Occasional Notes, has now become the Foreign Section, and is reserved for articles, either original or compiled, on professional subjects connected with Foreign Naval and Military matters; also for notices of Professional Books, either Foreign or English.

The Council of the Institution wish that this section shall be developed still further, and I have undertaken to continue my Editorship during the current year, with a view of aiding them in carrying out this work. It seems to me possible to make this section, and consequently the Journal, the means of keeping our Members acquainted with all naval and military progress abroad *pari passu* with that progress; and I shall be glad to receive from members of both Services, including in the latter those of the Auxiliary Forces, suggestions, information, or offers of assistance.

It is desirable, further, that I should state that, as regards editing the Naval matter in the Section, I shall have the aid of Naval Officers, thoroughly competent to give good advice and to pronounce sound opinions.

It must, however, be borne in mind that, as the change from a quarterly to a monthly issue has been made in order to ensure the more prompt publication of the Lectures after their delivery than has hitherto been the case, the Foreign Section will, as a rule, be restricted in extent during the Lecture season in the first half of the year, and will be prominent in the second half.

It is requested that communications and books for review (the latter under cover to the Librarian) may be addressed to me at the Royal United Service Institution, Whitehall Yard, London, S.W.

LONSDALE HALE,

Colonel R.E. ret.

THE NAVAL SCHOOLS OF THE CHIEF CONTINENTAL POWERS. PART III.

(Continued from No. 168.)

Compiled by Major W. TENISON, the Manchester Regiment, from papers in the "Rivista Marittima," by 1st Class Commissary DANTE PARENTI.

Russia.

THE Russian Naval School is established at St. Petersburg, on the Vassili Ostrof, in a large building capable of accommodating from 500 to 600 students. The Staff consists of an Admiral as Commandant, a Director of Studies, a Director of Exercises, 5 company Officers, 12 Officers (Professors), 60 non-commissioned officers, and 130 civilians (Instructors and employés).

The course of studies lasts over four years, the first of which devoted to a preparatory course, the remaining three to scientific and naval instruction, with a yearly practical course on board ship, from June to September.

The students are divided into two sections and six sub-sections.

The finances of the School are confided to a Council of Administration, composed of the Director of Studies, the Chaplain, and the Professors. This Council of Administration has also charge of all matters relating to the organization of the studies, the instruction, and the time tables and programmes of work to be carried out.

Conditions of Admission.—The right of admission to the Naval School may be obtained by—

1. The sons of hereditary nobles.
2. The sons of superior Officers.
3. The sons of hereditary notables (a title which may be conferred by the Emperor on certain burgesses, who for ten years have rendered signal or meritorious services to the State).

In Class 2 a candidate must furnish proof of having been born after the promotion of the father to the rank of superior Officer. Exception, however, to this rule is made in the case of a candidate whose father may have obtained by his ulterior promotion the right to rank as hereditary notable.

The candidates must be over twelve years of age on the 1st September of the year of admission, and under fourteen years, and must show a natural aptitude for the naval service. They must undergo a medical examination, before a Board of Officers nominated by the Admiralty, who take particular notice of those defects which would debar them from service. Any disease which may show itself after

the admission of a candidate will cause his instant dismissal from the School. The candidates' sight is tested by the Snellen-Reich scale; letters and signs 23 millimetres high must be read distinctly and without effort at a distance of 20 feet; and as to colour blindness by the Holmgren system.

Parents or guardians desirous of obtaining admission to the School for their sons or wards who have not yet attained the limit of age must send in their claim not later than the 15th July, together with a certificate of baptism, duly attested by competent authority.

In the case of students at Government establishments, a declaration from the Director of the Institute will be sufficient, in lieu of a baptismal certificate. If the claim is made by a guardian, a legalized copy of the right of tutelage must be attached.

The Examinations.—Those authorized to present themselves at the entrance examination must attend at the Naval School at 10.30 A.M. daily on the 12th and 13th August, to undergo medical examination, if not previously so examined.

The examinations begin on the 16th August, and continue till the 26th August. The examinations are public. Those candidates who have been declared medically fit, and have passed successfully the examination, are admitted into the preparatory class.

The first twenty-four are admitted at the cost of the State. The next seven must defray the cost of their maintenance, but have a claim to certain scholarships, which, however, they may forego in favour of others. These scholarships have been founded at the Naval School by the liberality of individuals and recognized bodies, after whom they are called.

The privilege of admission at the cost of the State is granted in the first instance to the sons of hereditary nobles who have given proof of the required ability; next in classification follow the sons of superior Officers; and lastly, the sons of hereditary notables.

In order to obtain one of the above-named scholarships, a candidate must have passed the entrance examination, and been classified as "good."

In classifying the sons of superior Officers, the following gradation is observed:—

1. Sons of Officers who are serving, or have served, in the Navy.
2. Sons of Officers who are serving or have served in naval establishments; sons of Doctors attached to naval establishments; grandsons of naval Officers.
3. Sons of Officers attached to the Admiralty and other establishments dependent on the Navy, and grandsons of Officers and Doctors attached to these establishments.
4. Sons of other functionaries who have a legal claim to admission to the Naval School.

In the case of either maternal or paternal grandsons of naval Officers, and of Officers and Doctors attached to naval establishments, in addition to the certificates of birth, there must be attached to the claim for admission another certificate proving the parentage, and, if necessary, the certificate of birth of the parents, and the declaration of nobility

obtained from the provincial authority in whose jurisdiction they are domiciled.

Those candidates who have failed to pass the examination, or who, having passed, are unable to enter the School through inability to do so at the expense of the State (all such places being already filled up by candidates having prior claims to this privilege), may present themselves for re-examination the following year, provided they have not passed the limit of age.

All documents of those candidates who are not admitted are returned on application.

The subjects for the entrance examination are:—

The Catechism and Religion, Russian, Geography, Russian History, Mathematics, and French.

The maximum of marks is 12, according to which the general classification is made. All are rejected who fail to obtain—

a. 8 marks in oral examination in Religion and Mathematics, or in the written solution of mathematical problems.

b. 6 marks in oral examination in Russian.

c. 5 marks in oral examination in History, Geography, and French.

The parent or guardian of every candidate claiming admission to the Naval School must send in to the Chancellery of the School, together with the application for admission, a document acknowledging formally his obligation to meet all the expenses of the candidate's maintenance in the event of his failing to obtain gratuitous maintenance or some special scholarship. This amounts annually to 530 roubles.

The yearly accounts of the paying students, and of those who hold a scholarship, are submitted for examination to the Ministry of Marine, and the sums due must be paid into the Public Treasury, the receipt being in due course sent to the School.

The uniform is provided by the School.

Those students for whom the sums due for maintenance have not been received at the appointed time, are dismissed from the School.

The sums paid for the maintenance of paying pupils can in no case be refunded.

The holders of scholarships and the paying students are in every way on an equal footing as those admitted at the expense of the State.

The holders of scholarships retain their scholarship during the whole of their sojourn at the School; the others pay only so long as they remain in the two preparatory classes.

The Studies.—The following are the subjects of study at the Naval School:—

Religion, Russian, French, English, Drawing, Natural History, History, Geography, Arithmetic, Algebra, Geometry, Geometrical Drawing, Statistics, Plane and Spherical Trigonometry, Integral Calculus, Descriptive Geometry, Mechanics, Physics, Chemistry, Physical Geography, Navigation, Pilotage, Astronomy, Theory of the Deviation of the Compass, Hydrographical Drawing.

Naval Construction, Naval Architecture, Steam Engines, Naval Artillery, Fortification, Submarine Defences, Law, Naval History, and Figure and Landscape Drawing (voluntary).

No pupil may remain in one class more than two years.

Each School year commences on the 15th September, and terminates on the 25th May. The summer months are spent on board one of the ships of the squadron of instruction.

Cadets are promoted to Midshipmen after passing the prescribed examination, provided they have passed twenty-four months on board ship.

Other Schools.

School of Navigation and Artillery, at Kronstadt.—No special conditions as to birth are necessary for admission. A candidate need only pass the necessary examination. The object of the School is the education of Master Gunners, Pilots, and Engineers.

The ages of admission are—

For the Artillery section, 13 to 17. For the Navigation, Construction, and Engineering section, 15 to 18.

At the end of the course the students, if they have passed the examinations successfully, are nominated probationers, and two years later, if they again pass the prescribed examination, obtain the effective rank of Officer.

A School of Artillery is annually established on one or more ships.

Torpedo Schools.—At Kronstadt, for Officers. Duration of course, eighteen months. Subjects of instruction, Physics, Chemistry, Explosives, Telegraphy, &c.

At St. Petersburg and Odessa, for non-commissioned officers, corporals, and seamen.

School of Musketry.—For Officers and non-commissioned officers. Subjects of instruction: Musketry, Fencing, and Gymnastics. The course lasts one year.

Superior Naval Academy.—At St. Petersburg, in the same building as the Naval School, for the higher education of naval Officers. The admission is by competitive examination. The course lasts two years, and the subjects of instruction are:—

Higher Mathematics, Mechanics, Steam Engines, Chemistry, Hydrography, Astronomy, Physics, Law, International Law, Tactics, Naval Construction.

There are special courses for Naval Constructors, Engineers, and Hydrographers.

Those Officers who have passed successfully the final examination wear a distinctive badge on the arm, consisting of two oak branches encircling the imperial cipher, and reap great professional advantages.

Spain.

The Spanish Naval School is established at Ferrol on the frigate "Asturia." The Minister of Marine, as chief of all naval corps,

institutions, and establishments, is Inspector of the School, and the General Commanding the Department is Sub-Inspector. The Staff consists of:—

A Post-Captain as Commandant and Director,
 A Captain as Second in Command and Sub-Director,
 A Commander as Third in Command,
 14 Lieutenants as Professors,
 6 Lieutenants as Duty Officers,
 An Administrative Official,
 Three Medical Officers, and
 A Chaplain.

The Instructors of modern languages, drawing, gymnastics, and fencing may be civilians, engaged under special contract, in the event of a dearth of Officers of the various corps capable of imparting such instruction.

The servants of the establishment and students' bôtmén are partly soldiers, partly civilians, as may be most advantageous.

Admission to the School.—The following are the necessary conditions for admission to the School:—

1. Application must be made direct to the authority named in the published notice of a forthcoming competition. To the application must be attached a baptismal certificate duly attested, testifying that the candidate is over 13 and under 18 years of age.

2. The candidate must be a Spanish subject.

3. He must be healthy and of good physique, as certified by a Medical Board composed of three naval Medical Officers, under the presidency of a Superior Medical Officer.

4. He must pass successfully an entrance examination in the following subjects, viz.:—

English or German, French, Drawing, Arithmetic, Algebra, Plane and Spherical Trigonometry.

5. He must furnish to the Board of Examination a certificate obtained from an accredited school, testifying to his knowledge of geography, and Spanish history and grammar.

The Board of Examination consists of—

A Post-Captain as President.

A Captain, or Commander, as Vice-President.

3 Lieutenants (2 of whom must be Professors at the Naval School) as members, and 1 Lieutenant as supernumerary member.

The Board record their opinion of the merit or demerit of the candidates by the following marks:—

7 Excellent, 6 and 5 very good, 4 and 3 good, 2 and 1 satisfactory, 0 unsatisfactory.

In order to obtain the total marks for each candidate, the foregoing marks are multiplied by the following coefficients:—

Drawing 1, English or German 1, French, Arithmetic, Algebra, Geometry, and Trigonometry 2.

The entrance examinations are public, but the record of the marks obtained is not published.

Sixteen students are admitted yearly.

Candidates after admission may, within the first fifteen days of their sojourn at the School, pass the first and second bi-yearly examinations, thus proving their complete knowledge of the required subjects, provided, however, that they pay the amounts due for the time that they have succeeded in saving thereby.

The following are the daily payments due for each candidate, and which may be paid either in one sum or quarterly in advance.

For sons of naval and military Officers, 2 pesetas per diem.

For all others, 3 pesetas per diem.

(1 Peseta = 1 franc.)

By a special law, passed 8th July, 1860, sons of Officers killed on active service are admitted at the expense of the State; and of these six are admitted annually, provided they obtain the requisite number of marks in the examination.

Officers' orphans are admitted at the reduced rate of 1 peseta per diem; the number not to exceed 15 in the School at one time. Those entitled to this privilege must send in their claim in due time.

Every candidate not eligible for gratuitous admission, or admission at reduced rate, must bring with him his outfit according to established scale, and all charges for uniform, &c., and for repairs and renewal thereof, must be borne by the candidate's parents, as well as all loss and damage of School property. These charges for uniform, &c., amount to 1,250 pesetas, which may be paid half on admission and half at the beginning of the second year.

Officers' orphans who have obtained gratuitous admission pay nothing, and are not required to furnish any outfit, provided they establish their claim 15 days before admission.

The School receives 1,350 pesetas from the Admiralty for each pupil admitted gratuitously, to cover all expenses incurred during his sojourn, and at the termination of the course, if promoted to Naval Cadet; and 250 pesetas for each half year spent in preparation for further promotion.

The Minister of Marine, as Inspector of the School, is Commandant-in-Chief. The General Commanding the Department wherein the School-ship may be anchored must, in his capacity of Sub-Inspector, visit and inspect it from time to time (making any proposition he may think necessary to the Inspector), and, when convenient, preside over the Board of Examination.

The Commandant of the ship is Director of Studies, and responsible for the moral, scientific, and naval education of the Cadets. He holds his appointment for four years, and has to send a monthly report on the discipline and administrative regulation of the School to the Commandant of the Department, and reports from time to time as to the capabilities and conduct of the Professors.

The Second in Command also holds his appointment for four years. He discharges the duties of Commandant during the latter's absence, and has charge of all school instruments, books, &c. He sends in a

written report at the beginning of each month to the Commandant on the progress and conduct of the students, and to their respective families on their conduct, punishments, and health. All punishments inflicted, and marks awarded, are entered by him in a register kept for that purpose. He publishes the orders issued by the Commandant.

The Third in Command takes the place of the Second in Command during his absence, and is a member of the Board of Administration and of the Council of Discipline. He holds his appointment for three years. He has under his special charge those students who are attending the School with a view to passing for promotion to Sub-Lieutenant.

Six Lieutenants are attached to the School as duty Officers. Of these two come on duty daily, one acting as Officer of the watch, in charge of the ship and the personnel attached to the ship, the other in charge of the students, as well during the hours of relaxation as during the studies. Both Officers on duty must attend all meals, and during the night they relieve each other at stated intervals.

The Professors have each charge of some particular branch of study. They send in a monthly report on the progress made by the students to the Sub-Director. They do not sleep on board the ship, except in case of necessity, but must report themselves half an hour before the commencement of the studies, and must not leave the ship till the evening. After three years as Professors they become eligible for the Naval Cross for Merit, with a distinctive badge corresponding to the rank they hold. A prize is given for any original work, of sufficient merit, which may facilitate the instruction of the students, 500 copies of which are published at the expense of the School.

The Chaplain must be a man of high literary and moral attainments: he has charge of the religious training of the students, and visits the sick daily.

The duties of the Administrative Officer are the same as those of the Paymaster on board a man-of-war. He holds his appointment for four years. At the end of each quarter he sends to the students' parents an account of all expenses incurred on their behalf, and reports in writing to the Director in the event of payment not being punctually made. He is a member and Secretary of the Board of Administration.

The duties of the Medical Officers are the same on the School-ship as on any other man-of-war.

No student may leave the School-ship except with the approval of the Minister, and with the permission of the Council of Discipline.

In the case of illness, and on the recommendation of the doctors, a student may obtain his discharge from the School, but it must first be approved by the Minister.

The principal duties of the students are:—

1. Absolute obedience and respect to their superiors, the Officers of the School, and all naval authorities.

2. Love of the profession they have voluntarily chosen, and to which they propose to belong.

3. Obligation to maintain and uphold at all cost the honour and reputation of the service to which they belong, and to conduct themselves always in an exemplary manner.

They must habituate themselves to keep always clean and neat all books, instruments, and articles of clothing, and to comport themselves decorously.

They are not allowed to possess or wear any article of jewellery, with the sole exception of a silver watch with a black guard.

The students are divided into four sections, each under the supervision of a Lieutenant, and to each section is appointed a corporal and a lance-corporal, who are selected from amongst the students on account of their application, progress, exemplary conduct, and fitness to command. They wear a distinctive badge on their right arm and are nominated by the Sub-Inspector on the recommendation of the Commandant, and receive a monthly allowance at the rate of 10 pesetas for corporals, and $7\frac{1}{2}$ for lance-corporals. They can be deprived of their appointment on the recommendation of the Council of Discipline.

(To be continued.)

NOTICES OF BOOKS.

Hastings and the Rohilla War. By Sir JOHN STRACHEY. Oxford: Clarendon Press, 1892. Pp. 324. Size 9" x 5" x 1". Weight under 1 lb. 10 ozs. Price 10s. 6d.

Directly this book is the clearing from baseless calumnies the posthumous reputation of one of the greatest of those men the hardihood and endurance of whom, says Sir Alfred Lyall, which won for England an Empire, were equalled only by the general justice and patience with which they pacified and administered it; and the author has, in doing this, wiped away what Macaulay characterized as a "lasting stain on the fame of England." The doubtfulness of the accuracy of Macaulay as a historian is generally admitted; Burke, the bitterest and most eloquent of opponents, is not much read by the rising generation; but James Mill still holds the position as the authoritative writer of Indian history. Of Mill, Sir J. Stephen writes, "His want of accuracy is nothing to his bad faith." Everyone who has read or intends to read Mill to learn about India should carefully first peruse this ably-written and interesting work from the pen of Sir John Strachey.

Imperial Defence. By Sir C. DILKE, Bart., and SPENSER WILKINSON. London: Macmillan and Co., 1892. Pp. 234. Size 7½" x 5½" x 1". Weight under 1½ lbs. Price 3s. 6d.

In the Introduction the authors point out the necessity of the British Empire being prepared for war; they then turn to the primacy of the Navy and the command of the sea; and so far probably there will not be much dissent from the general views they hold. In the two following chapters the debatable subjects, the Peace of India and the North-West Frontier, are taken in hand, and we gather that for the defence of India two army corps from England will be required when the decisive moment arrives. How these are to be furnished comes under the heading "The Armies," which include one entirely under the control of the Indian Government, which would arrange its own service on the basis of an enlistment for a long term of service followed by pension or money gift, and a Home Army able to put into the field 7½ army corps; all Colonial stations being handed over to the Marines. By this latter expedient the naval bases, the ships for which they exist and which have to protect them, and the garrisons of their forts, will then, it is claimed, have the advantage of being under the undivided command and administration of a single authority—the Admiralty. Until the scheme is fully carried out, the Militia and Volunteers are to be formed into army corps of their own, comprising all the necessary arms, and every auxiliary service, such as transport and commissariat.

The authors appear to be much annoyed at a fact they seem to think they have discovered, namely (p. 180), that the "British Army at home has no Generals," and they add, it "can have none until its battalions are settled and grouped into brigades, divisions, and army corps." Good times are at hand for our Colonels if only our two military advisers have their will, for they say: "In the absence of Generals there is no guarantee that even the elementary work, the training and handling of battalions, is conducted on principles calculated to ensure their fitness as component parts of an army." Further, in order to teach the Generals, change of quarters at home is to be put an end to, and (p. 144) every battalion, battery, and squadron will have a permanent home, and so can be formed permanent

brigades, divisions, and army corps. When Sir Charles Dilke and Mr. Spenser Wilkinson have worked out their schemes in detail, as military men would have to do before carrying them out, and have submitted them to public criticism, then will be the time to consider the working value of proposals now put forward in the crudest form only.—L. A. H.

Journal of the United States Artillery. Published by the authority of the Staff of the Artillery School. Artillery School Press, Fort Monroe, Virginia. Pamph. Pp. 80.

This is the first number of a new Service publication on the other side of the Atlantic. We wish it every success.

Britannic Confederation. A Series of Papers by Admiral Sir J. Colomb, Professor E. A. Freeman, George G. Chisholm, Professor Shield Nicholson, Maurice H. Hervey, and Lord Thring. Edited, with an Introduction, by A. SILVA WHITE. London: Philip and Son, 1892. Pp. 180. Size $7\frac{3}{4}$ " \times $5\frac{1}{2}$ " \times 1". Weight under 1 lb. Price 3s. 6d.

This is a series of papers originally published in the "Scottish Geographical Magazine," and they are now re-issued in book form in order to meet the demand for a wider circulation. There are no dogmatic conclusions to be drawn from the volume, for, as Mr. White tells us in the Introduction, "At present we are only groping in the dark towards the attainment of an ideal on which history sheds little or no light." Sir J. Colomb gives "A Survey of Existing Conditions;" Professor Freeman deals with "The Physical and Political Bases of National Unity;" Mr. Chisholm with "The Commerce of the British Empire;" Professor Nicholson writes of "Tariffs and International Commerce;" Mr. Hervey considers, under "Alternative Measures," race union and race disintegration; whilst, finally, Lord Thring treats of the "Consolidation of the British Empire." The book is a mind-opening contribution to the whole question.

Nicknames and Traditions in the Army. London: Gale and Polden. Pamph. Pp. 117. Price 1s. post free.

The Advanced Class-book of Modern Geography; Physical, Political, Commercial. By W. HUGHES and J. FRANCON WILLIAMS. London: Philip and Son, 1892. Pp. 818. Size $7\frac{1}{2}$ " \times $5\frac{1}{2}$ " \times $1\frac{3}{4}$ ". Weight under 2 lbs. 2 ozs. Price 3s. 6d.

A useful book of reference.

La Russie et l'Invasion de l'Inde. Par PIERRE LEHAUTCOURT. Paris: Charles Lavauzelle, 1892. Pamph. Pp. 21.

This is a very brief summary arrived at from a French point of view. The writer indicates Herat-Candahar as the most probable line of invasion, and Candahar-Ghazni-Cabul as the line of defence; he considers that the enterprise would be very difficult of execution, and regards any prophecy as to the final result impossible; at the same time he seems to think the simultaneous defence of India and of the rest of the British Empire a crushing task to have to perform.

Notes on Fortification. By Lt.-Col. FOX IRWIN. Jersey: Le Feuvre, 1892. Pp. 98. Size $9\frac{1}{2}$ " \times $7\frac{1}{2}$ " \times $\frac{1}{2}$ ". Weight under 1 lb. 2 ozs. Price 3s. 6d.

This book is one of printed notes on the subject it deals with; it contains references to the text-books, and is interleaved so that students may draw opposite to a note the figure referred to in connection with it.

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Friday, March 11, 1892.

GENERAL SIR C. P. BEAUCHAMP WALKER, K.C.B., Vice-President, in the Chair.

PIGEONS FOR LAND AND SEA SERVICE, WITH EXAMPLES FROM RECENT EXPERIMENTS.

By W. R. TEGETMEIER, Esq.

SIR BEAUCHAMP WALKER AND GENTLEMEN,

I am quite aware that two lectures have been delivered in this room on the subject on which I have the honour to address you, and I may say that I have read those lectures carefully, and with very much interest. In one or two points I may differ from the authors, but I cannot but express my thanks to them for the information which they have conveyed to us, and if I do differ from them I shall say so with some degree of hesitation.

The subject that is proposed to us to-day is—Pigeons for Land and Sea Service, and also with reference to the Recent Development of their Utilization. The two lectures of which I speak really dealt a great deal with the modern development of their utilization. The lecture by Major Allatt was given five years ago,¹ and it was accompanied by maps, which he has done the kindness to lend me, which were also reproduced in the Journal of the Institution.

The lecture by Captain Aston² was given only two years ago, and that was from a rather different standpoint.

The accompanying map, which was compiled during the course of last year, will give you an exceedingly good idea of the extensive organization that now prevails on the Continent with regard to the utilization of pigeons for military purposes. The map, as it were,

¹ See Journal, vol. xxx, No. 133, 1886.

² Delivered before the Metropolitan Volunteer Sergeants' Tactical Association, at the theatre of the R.U.S.I., January 13, 1891, and published as a pamphlet reprinted from "Homing News," February 20, 1891).

speaks for itself. It was taken from a French source, "La Nature," and was used by me in an article published in the English "Nature" during last month. Every one of the lines upon the map shows a pigeon post. In most cases it shows a double post, that is to say, there are relays of pigeons at each end of those lines, so that, for example, not only can birds be sent from Paris to the fortresses on the German frontier of France, but others can also be sent from those fortresses back to Paris. There is a large organization of homing pigeons in Paris, and there are lofts for homing pigeons at every one of those forts. You see that this system extends throughout France, Germany, Austria, Russia, Spain, Italy, and Portugal, and, in fact, already extends into Africa. The utilization of pigeons for military purposes, therefore, may be taken as accepted, and as no longer requiring to be proved. I urged this myself more than twenty years ago, in a letter which was published in the "Times" of the date of January 27, 1872. I wrote that letter after liberating a flock of some 300 homing pigeons to fly to Brussels, 200 miles off. After liberating the pigeons I went to the telegraph office in the Crystal Palace, and announced the departure of the birds. I telegraphed, "Birds off; weather fine; wind south-west." The pigeons arrived and gave notice that they had been liberated before the telegram announcing their departure had been delivered. The first birds arrived in Brussels at 5.28. There was, of course, considerable delay in the telegraph; they were not as expeditious then as they are now; but, as I say, the telegram was not delivered until three or four minutes after the arrival of the first pigeon. On that occasion I wrote the letter to the "Times," in which I said: "The Prussians, wise in their generation, have taken lessons from the Parisians, and established pigeon posts into Metz and their other fortified towns. In the event of a war in which we may be engaged, what would be the value of birds that would convey messages to Jersey, Guernsey, &c., when the telegraph wires had been cut by the enemy?" The matter now may be considered as so well established that I will not dwell upon this point, but I would just take the liberty of reading to you a couple of letters that I have received on the subject. The writer of one of those letters, I am happy to say, is present, and will no doubt give us the benefit of his experience. Major Allatt writes to me:—

"It may interest you to learn that a loft is about to be established at Gibraltar. I had a letter on the subject a fortnight ago. About three months ago the Naval Intelligence Department of the Admiralty sent round a circular letter to many of the flying clubs to ascertain how many birds they had in training, and what would be the routes then worked over, so that I presume there is an idea to make use of pigeons for naval work. Captain Brittan, R.M.A., now at the Admiralty, in London, has the matter in hand."

Singularly enough, only two or three days before the receipt of the letter from Major Allatt, I had a letter from Major Hussey, R.E., at Gibraltar, a gentleman with whom I had not had the pleasure of any previous acquaintance. He wrote to me:—



CHART SHOWING THE SYSTEM OF MILITARY PIGEON POSTS IN THE CONTINENTAL KINGDOMS.

FRANCE: 1, Mont Valérien; 2, Paris; 3, Vincennes; 4, Lille; 5, Douai; 6, Valenciennes; 7, Maubeuge; 8, Mézières; 9, Verdun; 10, Toul; 11, Langres; 12, Belfort; 13, Besançon; 14, Lyon; 15, Marseille; 16, Perpignan; 17, Grenoble; 18, Briançon.

PORTUGAL: 1, Lisbonne; 2, Porto; 3, Valence; 4, Chaves; 5, Bragance; 6, Almeida; 7, Guarda; 8, Coimbre; 9, Castello Branco; 10, Abrantès; 11, Elvas; 12, Peniche; 13, Beja; 14, Lagos.

ESPAGNE: 1, Madrid; 2, Figueras; 3, Iaca; 4, Pamplona; 5, Ojarsun; 6, Ferrol; 7, Ciudad-Rodrigo; 8, Badajoz; 9, Tarifa; 10, Ceuta; 11, Melilla; 12, Palma; 13, Mahon; 14, Zaragoza; 15, Valladolid; 16, Cordoba; 17, Malaga; 18, Valencia.

ITALIE: 1, Rome; 2, Ancone; 3, Bologne; 4, Vérone; 5, Plaisance; 6, Alexandrie; 7, Mont Cenis; 8, Fenestrelle; 9, Exiles; 10, Vinadio; 11, La Maddalena; 12, Cagliari; 13, Gaeta; 14, Gênova.

SUISSE: 1, Thun; 2, Bâle; 3, Zurich; 4, Weesen.

ALLEMAGNE: 1, Berlin; 2, Cologne; 3, Metz; 4, Mayence; 5, Wurtzbourg; 6, Strasbourg; 7, Schwetzingen (en projet); 8, Wilhelmshaven; 9, Tonnig; 10, Kiel; 11, Stettin; 12, Dantzig; 13, Königsberg; 14, Thorn; 15, Posen; 16, Breslau; 17, Torgau.

AUTRICHE: 1, Comorn; 2, Cracovie; 3, Franzenfeste; 4, Karlsburg; 5, Serajewo; 6, Mostar; 7, Trieste.

DANEMARK: 1, Copenhague.

SUÈDE: Carlsborg.

RUSSE: 1, Brest-Litovsk; 2, Varsovie; 3, Novo-Georgievsk; 4, Ivangorod; 5, Luninetz.

Reproduced, by permission, from Mr. Tegetmeier's article in "NATURE," Feb. 4, 1892, on "The Utilisation of Homing Pigeons."

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"DEAR SIR,—I have been instructed by H.E. the Governor to start a system of pigeon post between Gibraltar and Tangier, and have already constructed a loft which I trust will answer the requirements at first, and can be improved later on. The loft is circular, about 30 feet in diameter, and 8 feet 6 inches high. I am now writing to ask your advice as to birds. It will, I know, be difficult to obtain money from the War Office for this service, but I am so convinced of the great advantages to be derived from this system that I am prepared to incur some small expense to make a start on however small a scale."

When such men take the matter up there is no doubt it will be done effectually. Major Hussey must feel great interest in the matter, otherwise he would not write in this manner. I may tell you now that unless men who take personal interest in the birds can be got to superintend them, look after them, and train them properly, there is very little hope of establishing pigeon lofts and pigeon communication successfully. The pigeon-keeper must be a man who takes an interest in the matter, and has a love of the pursuit.

I think I shall have occasion to show you that it will be, in our country at least, very advantageous to depend upon the racing clubs for the supply of birds. If you will look at the map you will see that one of the few countries on the Continent where there are no pigeon posts is Belgium. Well, there are 600,000 racing birds in Belgium, and every one of these, in the case of a war, would be put at the disposal of the Government. Every one of these is a trained bird. They used to train them over the south of France, but that is now interdicted, and no birds from Belgium or Germany are allowed to be trained in France. Fortunately for our own pigeon fanciers this restriction does not apply to England, and I have here the Regulation which permits our birds being flown from France, a permission that is not accorded to the Belgian or German birds. Of course it is obvious to you, as military men, why this permission should not be accorded. In the event of a war birds would be smuggled into the interior, and information could be carried out. So many of our flying clubs have trained over to Cherbourg and other places in France that it would have been a very great hardship to have prevented them, and so the application was made, and I will read to you this short account from the "Stock-keeper" of the present month to show how the matter stands:—

"We have much pleasure in calling our readers' attention to a letter in our columns with reference to the liberation of English birds in the south-west of France. Committees must remember to furnish their *convoyeurs* with the necessary certificate from authorized authorities of the town where the club is held."

This is the letter from the Secretary of the London Flying Club:—

"SIR,—In accordance with my promise I enclose herewith copy of letter sent to Her Majesty's Minister in Paris on the above subject. I am glad which he has been good enough to send to me.

“ ‘To the Minister.

“ ‘By a Memorandum dated the 2nd of this month you have expressed a wish to know if English pigeon societies will be allowed to liberate their birds in France. I have the honour to inform you that the liberation of pigeons will continue to be authorized on the conditions that the senders are English; the production (*provenance*) of the pigeons also English, and be attested by certificates duly authorized by the authorities of the place from whence they came. Believe me, &c. (Signed) RIBOT.’ ”

That will give you some idea of the precautions that the French are taking against the introduction of trained pigeons from other countries; if you will again look at my map you will find a large number of pigeon posts that emanate from Paris. Not one of them comes towards the coast opposite England. They have no fear of us, and no idea that we shall utilize the birds in any way against them; and they make no arrangement, at present at least, to get information from the coast of France to Paris. All the pigeons go to the German frontier and the Mediterranean.

I now return to Major Hussey's letter. Major Hussey went on to say: “The most important service which the pigeons will have to render is to provide a speedy and certain means of communication between Tangier and Gibraltar, distance 30 miles. Homing pigeons will be of immense convenience to Officers and others shooting in the wilds of Spain, where there is not any postal service, and where roads scarcely exist. Possibly homing pigeons would be a very great convenience to the Fleet. In all these cases I think a maximum of 70 miles flight would suffice.” Then he asks me to obtain these birds for him, and I hope to be able to put him in the right direction. Major Hussey's letter is, as you see, essentially practical.

The history of the pigeon post and its organization was dealt with by Major Allatt in his lecture, and is so generally understood that I do not think I need say much about it. Of course, as you are aware, the first great organization of pigeon post was at the siege of Paris. I would call your attention for a few moments to some of the very interesting documents and papers that I have before me, which I think have never been exhibited in public. During the siege of Paris a number of pigeons were sent out by balloons. Here is the volume “*En Ballon*,” which contains the whole account of the balloon service which went out of Paris during the siege. You will find that about 300 pigeons were sent out. Of the balloons two or three were lost at sea. Some fall into the hands of the Prussians, others descended on neutral ground and on French ground. The pigeons were then, in the first instance, taken back to Tours, and their messages were attached to them, and the liberated pigeons went into Paris. I have here two of the original telegrams that were sent back. They are not, as was subsequently the case, micro-photographed on collodion films, but were written and photographed on paper; if you will look at this despatch you will see a number of letters written in ordinary handwriting, and also despatches from the Ambassador in Brussels to the French Government. These latter were written in cipher, and all in

numbers, so that they appeared something in this way—9, 27, 18, 4, 7, and so on. What all this meant, of course, no one knew except those who had the key to the cipher. Here, again, is a letter which you will see has on it the postage stamp of the French Republic: it is also stamped, "*En ballon monté.*" That letter was found in the middle of the English Channel. Two or three of the balloons disappeared, no one knew where. You hear of their loss, but where they went, and where the men went, no one knows. Some of these balloons passed down the Channel, when the aeronauts tied up the mouths of their post-bags, and threw them over, and some of them were taken up by fishing boats. Here is a letter sent out of Paris, "*en ballon monté,*" and directed to a lady in London. It is from her son, who was in Paris at the time. He was a thorough Frenchman at heart, and the way in which the boy speaks of the work he has got to go through, and how he has to run off to the front at the sound of the bugle, makes the pulse beat faster to read. I have here also the later development of the Paris pigeon post. Here is one of the documents which were issued by our own Postmaster-General; it is headed: "Open letters for Paris, transmission by carrier pigeon. The Director of the French post-office has informed me that a special despatch by means of pigeon correspondence, addressed to Paris, has been established at Tours, and may be made use of for brief letters." It goes on to say every letter must be posted open, that it must not consist of more than twenty words; that no figures may be used; that the number of the house must be given in words; that combined words may not be used; the letters must be written in French in clear intelligible language; that they must relate solely to private affairs; and no political allusions will be admitted. The charge for the letter is 5*d.* a word, and 6*d.* for the registration of the letter. The date of the document is 16th November, 1870. Those are the conditions. Here is one of the envelopes in which the letters, when received by our post-office, were despatched to Tours. Here is what you may call a way-bill—a sheet containing the number and destination of the letters. These letters were sent over to Tours; were set up in type, and micro-photographed on collodion films. This little film, half an inch square, contains three columns of print, in which are reproduced 200 letters, each of twenty words, the postage paid on it was 40*l.* Sixteen of these were photographed together on a film of collodion so thin that as you breathe on it it curls up with the mere moisture of the breath, and practically possesses no weight. The weight of 40*l.* worth of letters is one-eighth of a grain, that is to say, forty of these sheets are equal to the weight of a single pea. I need not tell you that a pigeon would not be incommoded in carrying them.

As other examples of the practical work done, I may state that I have despatched five large flights of pigeons over to Brussels: two from the Crystal Palace, two from the Alexandra Park, and one from Northumberland Street, Strand, and in all those cases the birds went very well. At the present time there are homing or racing pigeon clubs in nearly every considerable town in the kingdom. These

really owe a great deal of their success to the energy that the present member for Market Harboro', Mr. Logan, threw into the pursuit. He spent a large amount of money and a great deal of trouble, and got together a large number of amateurs, who flew from Rennes, Cherbourg, and various places in France with very great success. This printed sheet shows the work of the United Counties Flying Club for the year 1883. The document is interesting, inasmuch as it gives the average velocity at which these races were effected. For example, from Granville, where the first, second, and third prizes were won by Major Colville, the velocity was 935 yards a minute. At Rennes, Mr. Logan and Major Colville divided the first and second prizes; the velocity was 1,100 yards a minute. From Cherbourg, across 60 miles of water, the wind being unfavourable, the velocity was only 800 yards per minute. In another race from Cherbourg the velocity was 992 yards per minute. These races show how successful the work is.

Having called attention to these matters, I think it will be worth while to speak of the practical management of a loft, which was not touched upon by Major Allatt or by Captain Aston in their lectures. The greatest mistakes were in the first instance made by those who established lofts of homing pigeons for military service. I have here an illustration showing, perhaps, one of the mistakes. After the Franco-German War a distinct pigeon organization was established in Paris; and in the *Jardin d'Acclimatation* you will see this building that was erected as a pigeon loft. No one who knew anything about homing pigeons would have built a place of this kind for their reception. All that a homing pigeon requires is a loft, or room of a size proportionate to the number of birds flown. It is perfectly useless to keep homing pigeons in what are popularly known as pigeon-houses on poles, or against the walls of houses. A room is required with shelves divided by upright partitions 2 or $2\frac{1}{2}$ feet apart. These divisions should be open in the centre, and at each end of the shelf should be placed a pigeon-pan made of earthenware for the eggs to be laid in, and the young to be hatched. I am convinced that twice as many birds, and much stronger birds, can be hatched by the use of nest-pans, because the birds are kept dry, warm, and clean by their use. They must be supplied with a sufficient amount of salt and grit.

There is no doubt whatever that the homing faculty in pigeons is hereditary. It has been intensified by careful selection, as the best birds are retained, and all the worst are lost in the system of training which is adopted. You must therefore begin with good birds. The only birds to be depended upon are those whose parents have been trained generation after generation, in which the homing instinct has been intensified.

All the best homing birds were originally obtained from Belgium. The word "carrier" is an unfortunate misnomer, because it has been applied to an English fancy bird, incapable of prolonged flight. "Carriers" are fancy birds with large wattles round their eyes and over their beaks. A good Belgian bird has the muscles of the wing

and chest well developed; the feathers of the wing are exceedingly broad, so that when it is extended there are no interstices between them; the feathers of the wing are not spread out like fingers, but each one overlaps and is overlapped by the others, so as to make a good resisting surface with which to strike the air. The pectoral muscles that move the wing must be very large and well developed. The keel must be perfectly straight and very deep, so that there is a good deal of flesh upon the breast of a homing pigeon. Then the back of the skull, where the brain is situated, is large and rounded. The skull itself possesses considerable breadth. The bird must have a certain amount of observation and intelligence, as well as these muscular qualities which enable it to fly long distances. Now these qualities, as I have mentioned, are hereditary, and no one who wishes to establish a loft should do anything but get birds from a reliable fancier who is flying his birds long distances.



Accurate portrait of homing pigeon formerly in the possession of the author.

I do not see any difficulty whatever in establishing a loft of birds in any position that may be required for military purposes. Neither cold nor heat affects the birds. The *Columba livia*, from which these birds are descended, is a native of all parts of the world, except in the very coldest: it is found in India, Egypt, and in most parts of Europe. It can adapt itself to any part of the world, and therefore there is no doubt that its descendants may be reared everywhere. But if a pigeon loft is established, it must be done with some degree of intelligence, and it must be done by persons who really, as I have said before, have a liking for pigeons, and will interest themselves in the matter, and train them properly. I have been concerned in two or three successful, and in some very unsuccessful, attempts to establish lofts of pigeons. One of the most

successful was when the editor of a Colombo paper gave up his loft of pigeons on the establishment of the electric telegraph from Point de Galle to Colombo. The electric telegraph was worked by the natives, and he found it was not reliable, so he applied to me for some more birds to re-establish his loft. Point de Galle is 70 miles from Colombo, a very long flight, rather too long to work the birds on a post, but still there was the coast line to fly by, and the birds did it very well. I have also had unsuccessful attempts, of which I think it is right to tell you. One of those was connected with Trinity House. The Trinity House applied to me on the occasion of the wreck of a German ship off the Sunk Lighthouse to establish communication between the floating lightships and Harwich. They did not ask me what they should do, but they told me what they wanted done. I said, "I do not think it will answer, but I will give you all the assistance I can." A loft was established in the old lighthouse at Harwich, and a number of young birds were raised there. When they were well trained, they were taken out to the lightships. The birds were so exhausted from the continual motion, after being kept a month at sea, that the experiment was not a very successful one. I know they saved one ship and one or two lives, but it was hardly regarded as sufficiently successful, and it was eventually given up. There was another unsuccessful experiment in which I have also been engaged. I speak of these failures, because, after all, failures are more instructive than successes. It was the supply of pigeons some years ago to some of the forts in India. I sent out a remarkably good lot of birds, and wrote out some very full instructions. I have heard that the birds were so mismanaged that they were allowed to breed with the wild pigeons, when the result was necessarily a failure. But there is not the slightest reason why it should have been a failure, had the pigeons been consigned into the hands of persons taking any interest in the matter.

There are one or two other points to which I should like to draw attention, although, perhaps, they are rather matters of detail. To show you the extent to which the pigeons may be utilized, even in this country, I may mention that a gentleman with whom I am acquainted is in the habit of having his daily paper brought to him from a town, five miles off, by pigeons. A page of a daily paper, weighing $\frac{3}{4}$ of an ounce, is rolled up tightly, and put round the neck of the bird, which is then liberated. It is rather a severe task for a pigeon, and would not answer for more than a short distance. Of course, in using pigeons for military or express purposes, this would not be attempted; but it will show you one mode by which pigeons can be made available.

There is another point to which I would like to call attention. Amongst the foolish statements that have been made in many of the pigeon books is one that, as the pigeons might be pursued by falcons, the plan used by the Chinese should be adopted of tying whistles to their tails to frighten away the falcons. In the book of Mons. Pierre de Roo, we have a drawing of a pigeon with these whistles attached to its tail. It is true the Chinese put them on, and

I have put them on. I have had half-a-dozen pigeons careering round my place with these instruments attached to them. Some of these whistles are very complicated: the remarkable fact about them is their excessive lightness. They are made of bamboo, cleared out to the most extreme tenuity; others are made of quill: they all make unearthly noises. But their use is a mere amusement of the Chinese, and has nothing whatever to do with the protection of the birds from falcons.

I was rather anxious to get for this lecture some information as to the work of the Admiralty in founding pigeon posts at the sea-ports, but it was regarded as being matter in progress that should not be discussed at the present time. I am, therefore, not able to give any definite information beyond the fact that the Admiralty, as is shown by Captain Allatt's letter, and also by that of Major Hussey, is experimenting on the subject; but it is not thought desirable to give any further information at present.

Major ALLATT (Duke of Cornwall's Light Infantry): I should like to make a few observations upon what Mr. Tegetmeier has said. I am a practical pigeon flyer myself, so that I am quite in sympathy with all the remarks he has made. I am glad he has made some allusion to the management of a loft of pigeons, because it is very important, and in the other lectures which have been delivered here, no attempt has been made to give any information on that point. If people imagine that they are going to get a lot of homing pigeons, even of the very best breed, descended from birds that have done the very best work, let them live in a loft and train them successfully, without having what I may call a considerable amount of technical knowledge in their management and in the system of training them, they will find themselves disappointed in the results obtained. Homing pigeons require a great deal of attention, they require the expenditure of a lot of patience, and, I may say, a good deal of money, if they are to be trained to fly any distance. I will give you one example. Pigeons are only fit to fly long distances when they are in good condition, and they are not always in good condition. The time for flying pigeons, of course, is in the summer and autumn, when there is a fair prospect of fine weather. That time is the breeding season. The hens lay eggs and the young ones hatch out. When the eggs are laid, the hen is not fit to fly; she is not fit to fly just before laying nor just afterwards. Neither the cock nor the hen is fit to fly for some days after the young ones are hatched. The cock and hen take it by turns to sit upon the eggs. The hen sits all night and most of the day. The cock sits six or seven hours in the day, but the hen takes the rest of the work. When the young ones are hatched, the cock and hen both feed them at first with soft food, which is contained in the crop,—no doubt the origin of the term "pigeon's milk." That soft food secretes itself in the crop of the parents, and, if it is not given to the young, becomes sour and the old birds become ill. If, therefore, pigeons are sent for a long fly soon after having hatched out their eggs, you cannot expect them to return home. That is one of the many details which have to be attended to in pigeon flying. I am saying this because I do not want people to imagine that successful pigeon flying is a thing so very simple to accomplish. When I was at Sandhurst some years ago I kept a loft of birds there. I attended to them myself and devoted a great deal of time to them, and I got very excellent results. I now keep a loft of birds at Dover. They are looked after by a boy, but I can get no really good work out of them, at least nothing compared to what they formerly did. The birds are of the same breed, of the best flying strain, they could not be better, but the fact is, simply, that they do not get the care and attention that they demand, and I am seldom there to look after them myself. The large map before us gives the lines of flight, and the small map which Mr. Tegetmeier has handed round also gives the principal lines of flight adopted by the

Continental nations, under the auspices of the War Ministers. These lines, you will observe, are mostly across dry land, few are across water. Now, in England many of our lines of flight, that is to say, the directions which have been adhered to by some of our private pigeon-flying societies, have been across water. For instance, some of their races are, or have been, from the Isle of Wight and from Cherbourg, and from other parts of France. From the Isle of Wight to Cherbourg is a distance of from 60 to 65 miles. The birds are tossed at Ventnor, and then, perhaps, ten days afterwards, are sent to Cherbourg to race from there. Now, I take it that if pigeons are required for use in England from a Government point of view, it will be for naval purposes. If they are used for naval purposes they will have to fly across some extent of sea. I will give you the result of my own experience of pigeons flying across the English Channel where it is over 60 miles in breadth. In 1886 the London Columbarian Society flew a race from Cherbourg. There were 148 birds liberated. The velocity of the winning bird was 1,370 yards a minute. There were fourteen prizes, and the fourteenth bird made 1,192 yards a minute, so that you will see that between 1,192 and 1,370 were the winning velocities in yards per minute, made over a course of some 140 miles, 60 of which was over water. Some of the birds had to fly to London and others to different parts of England. They nearly all homed. I sent seventeen birds and they all homed; one of them, a little hen, winning first prize. It was a lovely day, the atmosphere was perfectly clear, and there was a light breeze, favourable to the birds. We may assume, then, that a similarly successful result would ensue if good birds were let out under favourable atmospheric conditions from ships in the Channel to fly over about 65 miles of water, provided, of course, they were in good flying trim. On the 28th June, 1887, the London Columbarian Society flew a race from Dol, in France, over 200 miles from London. It was a most disastrous race. The weather was fine at Dol when the birds were liberated, but there was a thick mist in the Channel. I remember waiting for my birds, and looking out into the distance. I could not see more than about three miles. Bear in mind what those birds had to contend with. They had, first of all, to fly over nearly 100 miles of French territory to Cherbourg; then there was a broad expanse of sea in front of them: they could not see across the Channel, they could look into the mist, that was all. The pluckiest birds went straight on and landed safely somewhere on our coast; but out of 126 birds liberated only 7 got home the same day; that will show you the effect of weather in pigeon flying, and only 18 birds were reported home altogether. No doubt many were lost and drowned in the Channel. I sent 8 birds and got 4 back, and that was a good deal more than the average. You must not, therefore, imagine that pigeons are suitable for flying in all weathers. Sometimes, of course, the weather is undoubtedly too bad for any land birds to fly in at all. Sometimes one has to decide if this is the case or whether it is only just sufficiently bad to give a fair prospect of their reaching home, and, of course, knowledge of this sort is very valuable to persons who use birds as message bearers on important occasions. It is no use attempting to use a bird unless there is a fair chance of its homing. I might also mention another race which was attended with a curious and rather instructive result. The birds were let out in the Isle of Wight, and directly they had been liberated a gunboat began firing in the Sound. The birds flew round up to the gunboat; it fired again and they circled back again. They did the same thing several times, refusing to face the noise and smoke, and at last the majority of them settled somewhere in the Isle of Wight. At that time my pigeons at Sandhurst lived close to the saluting battery, and they were accustomed to sit on the top of the loft when the guns were being fired. I sent ten birds for that race, and they all came home in good time, six of them making a velocity of 663 yards a minute. There were no other birds but mine that made a higher velocity than 360. This shows that in training birds for use in war one of the things that have to be considered is that, for naval purposes, it would be as well to train them to fly over guns that are firing. I mention that as a case that should not be lost sight of. With reference to the probability of our naval authorities taking up the matter, I hope there is someone here to represent the Intelligence Department of the Admiralty. I know nothing about the intentions of the Admiralty beyond having received, as President of the Dover Pigeon

Flying Club, a communication from the Intelligence Department of the Admiralty in October last, asking the number of people belonging to the club who owned homing pigeons, the number of birds trained and other information. From this I think we may hope that our Admiralty are going to take the matter up. I am quite sure that for Channel service, and for service within a moderate distance of the English coast, homing pigeons, or birds of some sort, as message bearers, might be an exceedingly valuable adjunct to any English naval force. If you want to send a message to the shore, instead of sending a gunboat or other ship you let out your pigeons which are on board, and, if the weather is pretty good, there is a fair chance of the birds reaching home. You can go on using your pigeons, sending message after message. No doubt birds are exceedingly useful for naval purposes of that sort. The Italians use them very considerably in the Mediterranean in connection with their ships of war. The French also use them regularly and systematically in the Mediterranean during their naval manœuvres, so I do not see any reason why they should not be used in this country with advantage in a similar manner. I am glad that Mr. Tegetmeier made an observation as to the value of these homing pigeons, because it shows you the difficulty of getting together a lot of birds that have done really good work. When Mr. Logan's birds were sold in 1886, seventy of them fetched 670*l.*, or an average of 9*l.* 13*s.* 6*d.* apiece. That gives you an idea of the value of an exceptionally good pigeon, and it also indicates the many difficulties that have to be overcome before a good loft of workers can be established. I was reading the other day an extract from an old magazine which referred to other birds having been used as message bearers. We know that the swallow, the raven, and even the duck has been used for this purpose. We know that the eggs of wild ducks can be hatched out under tame ones, and that the young ones become perfectly tame. I can vouch for this from personal knowledge. In the paper I was reading there was an account of some ducks having been trained to fly a considerable distance. It appears to me if we are going to use birds to fly over water for naval purposes ducks would be better than pigeons, because, when the duck gets tired, he drops and sits on the water until he is rested, and then goes on again. Ducks have the further advantage of being able to fly at night, which pigeons cannot do. I really do not see why they could not be used as message bearers, but I do not know how far they would fly. There is another bird which it occurred to me might possibly be made use of, and that is the sea-gull. With this idea in my mind I once tried to "home" some young gulls. I got three little gulls about a month old; they were like little balls of yellow fluff. I kept them at Dover in a garden, and I allowed them when they were old enough to fly about. One of them came to grief very soon, and there were two left. These two birds used to fly with the pigeons, they became perfectly tame, would perch on the top of the house, and come down into the garden to be fed. One of them mysteriously disappeared, but the last remained altogether about six months, and then he disappeared also; whether he went away or got shot I do not know. Unfortunately I was not able to carry out the experiment thoroughly as I was so often away, but from what I saw it struck me as quite possible that gulls might be trained for message-bearing purposes, and I think ducks also. Mr. Tegetmeier has of course an amount of knowledge on these matters that I have not. He has stated that French birds have not been trained to fly across the water. In this he is misinformed. I happen to know that both in 1889 and 1890, a French pigeon society of Douvres, in Calvados, flew their birds from Plymouth, and that in one of these races at least the French Minister of War gave prizes, so that you see the French are apparently paying some attention to Channel work with pigeons. Paris pigeons are and have been frequently flown from Dover, and I believe from London. With regard to the Indian homing pigeons, I have had tidings of them. I have been told that they have crossed with the native blue rocks. Of course this would not improve their homing instinct. I am also informed that when a regiment arrives where the pigeon station is, they have to tell off an Officer to look after the pigeons. It is a paid appointment, and he gets so many rupees a month. He has to be a Subaltern, so naturally the senior Subaltern is always told off to look after the pigeons, quite irrespective of his knowledge. What has been the result? A lot of pigeons are occasionally put into a basket, and sent out about 20

miles. Some come back and some do not. It was not exactly known which came back and which did not, but a week afterwards there were five or six less birds, so that it was presumed some had been lost. Of course it is quite impossible to carry out pigeon-flying under such circumstances. The training of homers is simple enough, but it does require a good deal of care, experience, and technical knowledge.

Admiral LONG: I must first guard myself by observing that I have no mission from the Admiralty to say a single word here, and I know nothing whatever about what the Admiralty are doing. I only rose because I was formerly very much indebted to Mr. Tegetmeier for his kindness in giving me a little instruction about the matter some three years ago, and I am also glad to express my thanks again to Major Allatt for his kindness in supplying me with pigeons. When I was at Pembroke Dock I was rather taken with the idea of flying pigeons. At that time the Intelligence Department of the Admiralty were talking about it, and we got those pigeons. The Admiralty fitted up the loft according to Mr. Tegetmeier's drawings. I think we had a dozen to begin with. We bought them from two different places. I think I gave 30s. apiece for four of them, and Major Allatt gave me some. I lost two or three of them, but they became very numerous indeed. Where I failed was I had not the means of training them properly. I used to send them out whenever the tug went out, but that was not often enough. On one occasion we sent seventeen birds out in the Waterford boat, with instructions to liberate them off the Smalls, about twenty miles out in a straight line. It was a fine morning, and ten of them came back, but seven did not. Whether they were all liberated I had no means of knowing. On another occasion we took a lot out in the "Pearl." It was a very hazy day, and, as I was a good deal occupied with the steam trial, I really forgot to let them go till we were a goodish way off the land. I could see land perfectly well myself, but the pigeons might perhaps have experienced what Mr. Tegetmeier says, they had got rolled about a good deal, and, perhaps, did not feel very happy. They rose in the air, but on that occasion I think I liberated about twenty-five, and I never saw seventeen of them again. In spite of all this, the pigeons increased so largely that we were obliged to kill and eat them in order to keep them down; and, I am sorry to say, I believe that is the principal use that is now made of them; but it is a great pity. If there were only a torpedo-boat or the means of sending them out and training them, I believe they could be trained. But we must understand that the use of these birds at sea in England must be very limited. The weather, especially at a place like Pembroke Dock, is very often so very thick, I do not think the pigeons could make much of it, but still if birds were trained to sea-work they might possibly improve very much. But I think they would be exceedingly useful in war-time from cruisers; and we must not forget that there are many parts of the world where the climate is much more favourable for using pigeons than in England. Our ships are in all parts of the world, and there are certainly many places where it would be very useful indeed to establish a pigeon loft, and be able to use them from ships. It requires to be undertaken systematically, and I think it is now undertaken at Portsmouth, where there are always boats going out of the harbour, so that there is no difficulty about sending them out, and I believe they are having very good success with them, so far as I have heard.

Captain W. ST. JOHN HORNBY: I would like to say a few words on this very interesting lecture, as I claim myself to be a very old hand with pigeons in a practical way. As I have previously stated in this theatre I kept pigeons as a boy, and before I went to sea in 1850 I used to train pigeons, and I flew at that time what was considered a very long distance, twenty miles. When I have been paid off from ships I have always had birds. In 1871 I first had the pleasure of making Mr. Tegetmeier's acquaintance. I was then living in the country, and I had some very good Belgian homers from him, and that strain of birds did good work in 1871-72-73. In 1883, having for some time lived in London, I again started a pigeon loft, and I had one of the nicest, if not the best private, lofts at the West End. I never, for various reasons which I need not trouble you with, took part in the large pigeon clubs and long distance races, but flew my birds myself, from Boulogne and Belgium, mostly through the instrumentality and good offices of the late Mr. Ledger, who had, in connection with the South Eastern

Railway, the opportunity of sending birds across the Channel by steamer. I had one bird that came over during a very thick fog in the Channel, from Boulogne, and at the time when the bird appeared in my loft the guns at Folkestone were signalling to the steamer which was coming across on account of the thick fog. My pigeon had flown *over* the fog. We must all congratulate ourselves on hearing such a very interesting lecture from Mr. Tegetmeier, who is, unquestionably, the veteran pigeon fancier of England, and has been connected with the "Field" newspaper as naturalist for many years. It is principally through his writings and by the publication of his interesting little work, I think in 1871, or so, on the Belgian homing pigeon, that the introduction of Belgian pigeons into this country has been effected. Previously to that time the pigeons used for flying races in this country were all, more or less, what are called skinnums, dragons, or long-faced beards, and other birds of that type. It is through Mr. Tegetmeier's writings, and especially after the 1870 Franco-German War, that the pastime of "pigeon flying," on the Belgian system, has been so largely introduced into this country. The first success in getting the pigeons "across the water," *i.e.*, the Channel, was due to the energy of Mr. Lubbock and the late Mr. Ledger, and, I believe, also, of Mr. Tegetmeier himself. After that, the establishment of large pigeon-flying clubs, like the United Counties Flying Club, was due to Mr. John Logan, who organized and carried it out on a much more systematic basis than had ever previously been done; and from that date other clubs have been started on similar lines. The "London Columbarian," of which Mr. John Day is secretary, has been the most successful club, I suppose, that has ever been established. These clubs fly their birds during the racing season, 200, 300, and 400 miles. In Brussels every week during the racing season birds are flown 200, 300, 400, 500 miles, and in July last there was a race for 590 miles from St. Jean de Luz to Brussels. The winning bird did the distance (about 590 English miles) in 16 hours, or at the rate of about 38 miles an hour. I ought to mention that the winning bird arrived at its own loft the evening of the same day that it was tossed at Louvain, a town some few miles from Brussels. From the map you will see the great strides which have been made by the military Powers of the Continent in establishing lofts, and if such is the case, and upon which there is no doubt, I do not see why correspondence by means of pigeons, and the development of pigeon lofts should not be carried out by the Naval and Military authorities in this country, because, if the thing should be considered useless for that purpose, the sooner it is dropped the better, but if, as is shown by the use of pigeons during the siege of Paris, and the adoption of them by all the military Powers on the Continent since the Franco-German War, it demonstrates, I assert, the great value and usefulness of the pigeon for war purposes, and if we do not follow their example, I think a serious injury is being done to the naval and military forces of this country by not putting them in a more perfect state for defence. No doubt, for naval purposes, the flying over the water is, or rather *was*, the great difficulty with pigeons, but the problem has been solved by the Italians. As an example: they have a military pigeon loft at Rome, and another at the island of Maddalena, and the birds belonging to them alternately fly from one loft to the other in very good time. The total distance is 170 miles, and of that the water is 150 miles. The pigeons did that on several occasions at the rate of 28, 29, and 30 miles an hour. A longer distance by sea has also been done by them. They have another military pigeon loft at Cagliari, and they practise on what is called the Cagliari-Napoli line. The distance between those two places is 294 miles. They throw the birds from ships, and they have done a distance of as much as 287 miles over the sea at about 31 miles an hour. I think if our Government would take the matter in hand and help, a system might be very well established in this country. It might be done in two ways: either by the Government itself taking it in hand and establishing pigeon lofts, say, to begin with, at the principal ports, Plymouth, Portsmouth, Portland, Harwich, and so on. The distance from Cherbourg to Portland is but 60 miles, and from Cherbourg to Portsmouth but 74 miles, which distances, considering what the Belgian and Italian birds have done, the former over the land, the latter over the sea, is a mere trifle. I think, however that a better system, speaking from a naval point of view, would be for the Admiralty to help the well-established

clubs, say, the London Columbarian, the United Counties, the London Flying Club, and some good club, say at Manchester, Preston, and so on, by subsidies in the way of prizes. It would be far less expense, and the management would be still in the hands of those who are thoroughly *au fait* on the breeding and training of pigeons. It would not be a great expense, and it would be a great inducement to pigeon fanciers to develop their birds, in order to win the prizes. I think that as this principle of a subsidy has been already adopted in the case of the Mercantile Marine in order to keep certain ships ready for the Navy in case of war, it might also very well be adopted in some small degree towards helping a system of correspondence by means of pigeons. It would cost very little, say 50*l.* or 100*l.* per annum to each of these clubs. In return for such subsidy the Government would have the right to call upon each club for the use of its pigeons in case of war, and the whole apparatus could, if necessary, be placed under the control of the Government so long as the war lasted.

Lieut.-Colonel R. HENNEL, D.S.O. : Reference has been made to the failure of birds in India. A perusal of Mr. Tegetmeier's book and my interest as an Indian Officer led me to purchase two pairs of the finest breed in 1867. I took them out to India, by the Suez Canal, to make the experiment, but I had to land for duty at Aden. I followed all the advice given by Mr. Tegetmeier in my care of these pigeons. I was detained for a year at Aden, but during that time neither of these pairs of birds bred. I had during this time to take my turn of duty at the island of Perim, 90 miles off Aden, and I took one pair of birds there in the hope that they might breed. But they did not, and, therefore, I could make no experiments in establishing a pigeon post, as I hoped I might have done. I afterwards proceeded to India, and for some months the birds would not breed. I then purchased some of the best birds from the native fanciers. They have all kinds of birds in India, where they train them for racing purposes, for play, and all kinds of diversions. The pigeons I purchased were said to be good racing birds. I immediately got some results, as the birds began to breed freely, but, I am sorry to say, before I could train the young I was obliged to leave India, and my birds were handed over to a friend. I only make these remarks because it was strange that the English pigeons which were prize birds should not have bred in a climate where it was supposed that they would have done so. It is a curious fact they would not breed in India, and it was only when they were crossed with the native breed that they began to do so. In the year 1881, when the Government of India took up the subject of homing pigeons for military purposes, I was deputed to draw up a scheme for the introduction of carrier pigeons. I believe there were thirty-six pairs went out. They were tested in many ways. They were cared for by good men, though perhaps not in all instances, but I believe they have not altogether succeeded. There are a great number of kites and hawks in India, and it is believed a great number of the losses occur from these sources. There is no doubt about it that the homing instinct seems to disappear with cross-breeding. India is the land of pigeons; they are everywhere; training, therefore, is difficult. The great point is whether, if you breed in India, you can keep to the pure English homing pigeons, and keep them quite separate from the native or indigenous race, and in this manner not only keep up the homing instinct but improve it.

Admiral Sir R. VESEY HAMILTON : I should like to say a few words, though I do not think what I am going to say will lead to any discussion. I commanded the "Hydra" on the coast of Africa, in 1858 and 1859. We had a number of pigeons on board, the idea being to make pigeon pie. These birds were on board ship nearly three years on the coast of Africa, English Channel, West Indies, and Labrador, and were constantly flying about. They would go away two or three miles and come back again. I only mention this to show that pigeons can be kept on board ship in all latitudes, below 55° F., in all climates, and in all weathers. The only other question I should like to ask is what is the greatest distance pigeons have ever been known to fly? In the year 1850, Sir John Ross went to the Arctic regions and took four pigeons, one of which is supposed to have reached home; but I should like to have a little confirmation on that point.

Mr. TEGETMEIER : With your permission, I will make two or three very brief remarks in reply. The most important subject as far as regards my answer is that

which was alluded to by Major Allatt, viz., the use of other birds for flight. I regard that practically as entirely out of the question. Taking the case of ducks, wild ducks are migratory: they spend one part of the year in one district and one part in another, and you can hardly expect to locate them or to use them in the same way that we can homing pigeons. In the first place, you could not get them to go into a loft or into their house. Even if they were not migratory, I do not think they could be utilized in the same way as pigeons. Nor could we get gulls or any other birds that I am acquainted with so far attached to their homes as to be at all serviceable. The pigeon is one of those few animals—there are only about forty in existence—that are domesticated. We can readily tame individual animals, we can tame an individual pheasant which will fly at us and fight us occasionally, but to make pheasants, as a rule, attached to a house, is impossible. Domesticated birds, those that are really homers, are very few indeed. With regard to birds flying in a fog, I may state that very often they will fly over a fog. On the last occasion on which I liberated a flight of birds to go to Brussels, I let 300 birds off within 200 yards of this place. They were to have been liberated at six o'clock in the morning or earlier, but the weather was so very thick here, I refused to liberate them. They were kept in the paniers. At twelve o'clock the sun broke out, I liberated the birds, and they flew over what remained of the fog, and got back to Brussels in very fair time indeed. The race was over 200 miles, and it was accomplished in one day, not, however, by as large a number of the birds as would have been the case if they had been liberated early in the morning. In these long-distance flights the Belgians always endeavour to liberate the birds very early, four or five o'clock A.M. in the middle of summer. Their great objection to sending over birds here for flying matches to be witnessed by the public at large, is, that they do not like them being liberated as late even as twelve o'clock. With regard to the support of the clubs by the Government, as mentioned by Captain Hornby, I think it would be exceedingly important to give small prizes and subsidies to clubs at the seaports. We had, as was remarked by Captain Hornby, an exceedingly energetic pigeon-flyer and fancier connected with the export service at Folkestone, Mr. Ledger. If that club, which had very good members, had had a small subsidy, or had a few pounds been given by the Government each year, it would have been in existence now, and, no doubt, would have had many hundred good birds at the service of the Government. They would all have been managed by men who knew perfectly what their management should be. I am quite confident that good clubs of this kind, where men would keep their birds in the best possible condition to win the races, could be much better managed privately than they would by persons who were not personally and specially interested in them. The long distances mentioned, I think, are exceedingly undesirable. What is required practically in pigeon-flying is, not birds that could fly 200 or 300 miles, but birds that can be depended on with certainty to fly 70 or 80 miles. Practically, 100 miles would be greatly in excess of any real or useful requirement. Some of the distances on this map are far greater than any pigeon fancier would endeavour to establish a relay of birds. Before the establishment of the electric telegraph, it is very well known that the Rothschilds and the stockbrokers had relays of birds on the Continent: all the stock-jobbing was regulated by pigeon express. It is said the news of the battle of Waterloo arrived in England by pigeon express, and was communicated by the Rothschilds to the Government. This was accomplished by stages, so as to make quite certain that the birds would do the distance. There was no flight from Paris to London, but the message was brought by short stages, and transferred from one bird to the other. I was asked what is the longest flight? I believe the greatest distance pigeons have flown of which we have any accurate record, is in the races which have taken place two or three times from Rome to Belgium, a distance (the way in which the birds fly) of between 800 and 900 miles. But in every one of these cases a very large proportion of birds have been lost, although only old and very experienced birds have been employed. The statement about pigeons being sent out and returning from the Arctic regions, that was published in "Yarrell's British Birds," was perfectly imaginary, and was at my suggestion expunged from the last edition. I have here an account of a bird flying 1,500 miles

in America. This appeared in an American paper, and Professor Spencer Baird, of the Smithsonian Institute, wrote to me and asked me if it was possible that such a thing could be true. I wrote to him at the time, and told him that it was a fictitious account.

The CHAIRMAN: I am sure all who are here present will empower me to offer a very sincere vote of thanks to Mr. Tegetmeier for his very interesting lecture, and for his kindness in coming here to inform us on a subject which we all hope will grow into importance hereafter.

Friday, March 18, 1892.

CAPTAIN W. J. L. WHARTON, R.N., F.R.S., Hydrographer to the Admiralty, in the Chair.

ATLANTIC WEATHER AND ITS CONNECTION WITH BRITISH WEATHER.

By ROBERT H. SCOTT, M.A., F.R.S., Secretary, Meteorological Office.

WHEN I first had the honour of lecturing in this theatre, nearly twenty-three years ago, my subject was "Storms in the British Islands, and Telegraphic Weather Intelligence," and if, in 1869, any one had ventured to predict that within twenty years meteorologists would have been able to trace a storm from the Western Pacific Ocean, across America and the Atlantic, to our own coasts, it would have been set down as an impossibility. Yet this has actually been done, at least with considerable certainty, in the case of a storm which reached our shores October 24, 1882. The possibility of carrying out such a train of reasoning is due to the existence, in 1882, of the daily charts, showing the conditions of weather over a great part of the Northern Hemisphere, which were at that time published by the Government of the United States, and by our own office. Scientific development marches fast in these days, and it is hard to realize now that in 1869 not only were there no Atlantic weather charts, but that the very weather system of the United States, "Old Probabilities" as it was irreverently called, was not in existence at all.

The broad principles which govern the weather system of the Atlantic are shown on the two diagrams I exhibit of the mean barometrical pressure, and of the regions of greatest disturbance of temperature, on the globe, in our winter.

You see from the temperature chart that, at that season, the district which is relatively the warmest is near Iceland, and from the barometer chart, that close to the same region is the district where the barometer is lowest. To get at the reason of these relations we must go back to some of the first principles of modern weather knowledge.

It is a well-known physical fact that the amount of water vapour that can be suspended in the atmosphere depends on the temperature. If air is saturated with vapour, at any temperature, any attempt to force more vapour into it, without raising the temperature, must fail; while any reduction of the temperature of saturated air

condenses a portion of the contained vapour to the liquid form, producing clouds and rain.

The chief source of heat to the atmosphere is the sun, and it is this heat which enables the air to suck up the water vapour from the sea surface.

The most effective mode of lowering the temperature of air, and of restoring the suspended moisture to the earth again in the form of rain, is to cause the air to rise above the earth. We all know that it is colder on mountain tops than on the plains below, and the average rate of decrease is about 1° F. for every 300 feet.

To show what an efficient action is thus brought into play, it may be said that, if the air over the ocean near the Equator, at a temperature of about 80° , were to rise over the Andes, to a height of, say, 20,000 feet, it would sink in temperature some 70° , and the amount of moisture contained in a cubic foot of such air would fall from 11 grains to 0.8 grain, or, in other words, $\frac{1}{13}$ of the contained water vapour would come down as rain.

If then the ascent of the air causes precipitation, its descent must bring about the opposite effect, of absorption of moisture, and descending masses of air are dry, inasmuch as they are rising in temperature owing to compression, and sucking up all the moisture they can come across.

It is to this alternation of upward and downward motions in the atmosphere that our differences of weather are mainly due, and this idea, which is a recent one, has quite revolutionized the science of weather. It was formerly believed that the wetness or dryness of weather depended on the direction of the wind; but we now know that when, apparently, one of the driest of winds, the Atlantic south-east Trade, passes over the plains of Brazil and meets the Andes, it is forced to rise, and the contained moisture is squeezed out of it in the form of clouds and rain. When Mr. Whymper was among the Andes of Quito, he had to wait for days and days even to catch sight of Sara Urcu, one of the most eastern of the chain, as that was perpetually veiled in cloud coming up from the eastward.

The way in which the sun's heat acts when it reaches the surface of the earth is to heat that surface. This, in its turn, warms the air stratum resting upon it and causes it to expand. This stratum rises, like a blister, the lowest layer being most expanded and pushing up the next, and so on till the upper layers eventually slide off, producing an upper return current above.

Any upward motion, such as has been described, must give occasion for an indraught below, from regions less highly heated, in order to replace the air removed.

In fact, it has been shown that the characteristics of the summer and winter wind systems of the Spanish Peninsula are best explained by this attractive and dispersive action at converse seasons. In summer the air flows in towards Spain from the sea on the north-west, and south, and in winter it flows out from Spain to sea in all directions available.

We gather from this reasoning that relatively heated areas are

centres of attraction for the lower wind currents, are loci for eddies, for cyclonic systems; while cold regions are the positions where we find high barometric and anticyclonic wind conditions. This is what is shown on the two charts to which I have already alluded.

In order to show that this upward and downward motion produces real differences of pressure, capable of inducing air motion, we may take two mountain stations of about equal altitude, one near the Equator and the other in Latitude 39° N. The one is Antisana, among the Andes, the other Pike's Peak, in Colorado, and both stations have the elevation of about 13,300 feet. It need scarcely be said that the station at Antisana is some 6,000 feet below the top of the mountain. At both stations, observations have been taken for a long period, and the following are the mean results:—

	Antisana.	Pike's Peak.	A. above P.	P. above A.
Pressure at sea level..	29·88 in.	30·20 in.	—	0·32 in.
„ 13,300 ft..	18·55 „	18·03 „	0·52 in.	—

Accordingly, at the sea level there is a pressure of 0·3 inch in Colorado, pushing the air towards the Equator, and on top there is a pressure of half an inch, pushing the air back again from the Equator towards high latitudes.

The air, once set in motion, is modified in its course on the following principles, established by pendulum experiments. The horizontal motion of the air, in any direction, is, owing to the earth's rotation, subjected to a deviation depending on the latitude, the force being $2v\omega \sin \lambda$. In this v is the velocity of the wind, ω the earth's rotation, and λ the latitude.

All currents, therefore, in the N. Hemisphere, have a tendency to draw air away from the left hand side of their path, and to pile it up on the right; in other words, to make the barometer stand lower on the left-hand side of the wind's path than on the right. This is the law which holds good in cyclones and anticyclones.

To return to our upward and downward motion and its results. The counter-current, which is really the sliding off of the upper strata near the Equator, comes to the earth about the parallel of 30° N., and there produces the so-called "Calms of Cancer," the permanent Atlantic anticyclone, which shifts its position with the changes in the sun's Declination.

The anticyclone does not stretch across the ocean, but is located over the centre, or rather over the eastern part of it, and it influences the winds in its vicinity, their direction of circulation being with watch hands, viz., northerly on the African coast, easterly (the Trade wind) in the centre near the Equator, southerly along the coast of Florida, and westerly above the 30th parallel of latitude.

Over the whole Trade-wind area the weather is very constant, with few changes and, rarely, storms. The region is often said to be rainless; but this is not true, it is only one small area, south of the Canaries, which is really rainless in spring. To the south of the

Trade zone lie the tropical calms, with very light, and uncertain, winds and torrents of rain.

There the West India hurricanes are bred, for they are often fully formed when they reach the Windward Islands. They then advance north-westwards till they cross the tropic, where they recurve suddenly and move north-eastwards.

This is common to all tropical cyclones; they all move round the western edge of the anticyclone lying beyond the tropics in each ocean in which they are found.

It is, however, the more northern part of the area which interests us the most. The whole region from 40° to 70° N. is constantly visited by cyclonic depressions; in fact, you can hardly pick out a day on which there are not two or three distinct depressions existing somewhere over the area, though, perhaps, none of them attain the dignity of a storm, or are accompanied by more than a gentle breeze.

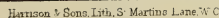
In order to throw some light on the origin and history of these depressions, and the storms which they at times bring with them, various institutions have prepared and published daily maps of the Atlantic.

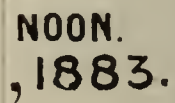
The fullest of these maps that appeared were those issued by our own office; they covered the period of thirteen months, commencing with August, 1882, the interval for which the international polar stations, on the plan proposed by Lieutenant Weyprecht, were in activity. In this way the office was able to secure observations throughout the winter from Jan Mayen and Spitzbergen, as well as from other localities which usually are visited only in the whaling and sealing seasons.

The Office invited all Captains to fill up observations daily on sheets supplied to them; the scheme was most cordially supported by all British seamen and by many foreigners also. In all nearly 3,000 ships co-operated, and about 400 observations were secured for each day. This is at least ten times as many as were available for any of the similar charts published elsewhere. Some 300 land stations were also utilized, and so the resulting charts were each based on about 700 observations. Specimens of the working and also of the published charts are on the table.

One of these latter, that for August 31, 1883, is given as Plate XIX. It exhibits one very severe storm, to which I shall refer later on, with its centre on the parallel of 50° , lying between the meridians of 25° and 50° W. In addition, no less than seven other depressions are visible over the map, two of them well within the Arctic Circle. Furthermore, we see the Atlantic anticyclone, with its barometer readings of 30.3 inches and upwards, lying between 20° and 40° N. over the Sargasso Sea, and another anticyclone, less pronounced, covering the north-eastern part of the United States. The map gives a fair representation of the general condition of the Atlantic on any day. The symbols used are explained on it.

From the study of charts like these, Dr. W. Köppen, of Hamburg has prepared the map of which a reproduction is displayed, and which





will be found in vol. xvii of the "Zeitschrift der Oesterreichischen Meteorologischen Gesellschaft." It shows the regions of greatest frequency of depressions throughout the year. The tracks form a broad belt, covering from 40° to 50° N. over the Eastern States and out as far as Newfoundland. It then becomes narrower, and extends north-eastward until it touches the Icelandic depression, throwing out, on its way, an arm up Davis' Straits. It then passes on and forks, one maximum lying near the Loffodens, and the other over the Southern Baltic.

Our own charts are drawn for noon on each day, and this interval of twenty-four hours is too long to allow of our satisfactorily connecting the positions of the depressions seen on successive charts. Depressions at times appear of which not a trace is discoverable on the chart for noon on the previous day.

These charts have been carefully examined, and thirteen monthly maps have been drawn showing the tracks of all the several depressions which were traceable. I do not say storms, but distinctly marked areas of depression. Of these there were in all 273; but, as very few of these appeared in August, 1882, when the scheme of observation was first started, I think it best to omit that month entirely, and confine my remarks to the twelve subsequent months, when the scheme was in full activity. This reduces the number to 264, and these fall into the subjoined table:—

Duration in days ..	1	2	3	4	5	6	7	8	9	10	11	12
No. of depressions..	36	33	40	31	27	23	22	14	7	13	6	3

Duration in days...	13	14	15	16	17	18	19	20
No. of depressions..	3	2	—	1	1	1	—	1

Of these, 140, or more than half, lasted less than five days. The instances of more than ten days' duration were rare, and those of much longer duration extremely so, and entirely confined to the autumn months. One of these was the storm of October 24, 1882, to which I alluded at the beginning of the lecture, and which Mr. Harries thinks he has traced from the Philippine Islands to England, a distance of 14,000 miles.

You will see from column 1 of the table exhibited that the distribution in the successive months does not vary much.

It is now interesting to see what we have learnt about these depressions, as to where they come from and whither they go. I have shown on the table (subjoined) some figures showing the distances to which these systems travel:—

	Total depres- sions.	No. appear- ing S. of 40° Lat.	No. passing 0° Long.	No. appear- ing S. of 35° Lat.	No. passing 0° Long.
September ..	14	4	3	2	2
October	26	7	1	5	1
November ..	15	5	2	4	2
December ...	24	7	1	1	1
January	22	8	2	2	1
February ...	19	1	0	0	0
March	31	9	1	0	0
April	18	4	2	2	1
May	24	5	1	2	1
June	26	4	0	0	0
July	26	3	1	0	0
August	19	5	2	4	2
Year	264	62	16	22	11

I have taken in columns 2 and 3 all the cases of depressions appearing south of the parallel of 40°, the latitude of Philadelphia; of these there were sixty-two, and out of this number only sixteen had sufficient energy in them to keep up their individuality until they passed the meridian of Greenwich, possibly very far north. The columns 4 and 5 give those starting in still lower latitudes, south of 35° N. This class includes the West India hurricanes, and has much greater vitality than those above described. Out of twenty-two cases, eleven, or just one-half, crossed the ocean. By this expression it is not implied that the cyclonic system had, throughout its course, or even at any part of it, sufficient energy to be ranked as a storm, or to have been a source of danger to shipping, but it would certainly have produced some disturbances of weather when it approached our coasts.

The dotted line on Plate XIX shows the track of the storm which was central over the ocean on August 31, as already mentioned. It swept over these islands two days later, and finally died out between Aberdeen and Lindesnaes before the 4th of September. It will be noticed that it started on the 25th of August to the northward of Porto Rico, skirted the American coast till it approached Cape Race on the 30th, and then set off eastwards. It was one of the twelve mentioned as starting south of the parallel of 35° N.

Another point of interest is to learn at what seasons disturbances showed themselves in low latitudes on the eastern side of the Atlantic, near the Azores or Canaries. Of these one appeared in each of the months January to July inclusive, and none at any other season. Consequently, in the latter half of the year, we are led to expect that the weather off the north-west coast of Africa would be found to be very constant.

An interesting fact is, that in the summer months, April to September inclusive, cyclonic systems coming up the American coast passed up into Baffin's Bay, and eventually died out there. There were

not less than seven instances of this occurrence during the summer examined, and in most cases the disturbances were traceable for four or five days within the Arctic regions before their final extinction.

Before I proceed to deal with the subject of the storms which come to us, I must say a word or two about the anticyclones. I made a complete set of anticyclone maps for the 400 days, and found that these systems move from west to east, but much more slowly than the depressions. The area near the Canaries is constantly being replenished by waves of high barometrical pressure coming over from the United States. In the whole thirteen months fifteen such travelling anticyclones were traceable, and none of them appeared in January, February, May, or June. The reasons for these exceptions are that in the late winter a belt of high pressure stretched across the ocean from shore to shore, and that in it no changes were perceptible.

In May and June the pressure over the United States was so low that no supply of condensed air was derivable therefrom.

We now come to the actual storms which are felt on our coasts. During the thirteen months of which we have been speaking thirty-seven severe gales were felt on our coasts. These were classified under the following heads:—

Appearing westward of Long. 40°	17
„ in Mid Atlantic	8
Formed close to the British Isles	9
Appearing to the eastward	3
	—
	37

In order to render it possible to receive intimation of the approach of a storm, this must have manifested itself on the American continent between the parallels of 40° and 52° (Philadelphia and the Straits of Belle Isle), for no depressions start to come eastwards at a lower latitude than 40°, and north of the Canadian system of stations no telegraphic reports are obtainable, and also on the western side of the meridian of 40°, for if a storm appeared to the eastward of that meridian, it could not be clearly represented on a map of the Continent of North America.

Of the seventeen cases included in the list just given, as starting near the American coast, only twelve fulfil the conditions of having come within the area of observation on the other side of the Atlantic. For these twelve storms, the times taken to cross the Atlantic were as follows:—

4	took	2	days.
3	„	3	„
1	„	4	„
1	„	5	„
2	„	6	„
1	„	10	„

It is evident that, in order for warnings of storms to be effectual, they must be timely; and if such warnings are sent from America, a

definite rate of progress must be assumed for each disturbance. The figures just given show, as far as can be shown from the experience of a single year, that this rate of progress varies within wide limits. It is evident that if a warning is issued too late it is useless, and if it is issued too early it unnecessarily causes alarm.

In order to test the possibility of gaining early intelligence of approaching storms, we, for several years, were in receipt of telegrams from the Chief Signal Office, Washington, giving reports of storms experienced by steamers arriving at American ports. The idea underlying this system is that most storms take three or four days to cross the Atlantic, and that a fast steamer can make a run of about 400 miles a day. Such a steamer, encountering a storm some 700 miles from New York, might, on arrival, telegraph the fact to Europe before the storm itself was due here. The practical outcome of all this service has been *nil*, as yet. I am disposed to think that this failure has mainly been due to the facts that the reports from ships have been neither numerous nor full enough. I exhibit the charts for two or three days.

During the year 1887 we received in all 608 ship reports: 452 from ships between 60° and 50° W., and only 156 from ships between 50° and 45° W. Not one of these enabled us to predict a storm, and many of them came in days and days late.

The idea has more than once been suggested that we should moor a ship some 500 miles from the Irish coast connected with Valencia by a cable. This idea has even attained the dignity of being made the subject of a question in the House of Commons. In order to gain the most authentic information on the subject, I applied to the Telegraph Construction and Maintenance Company for an estimate of the probable cost of laying a cable for 500 miles. The answer was that the cost would be about 50,000*l.* or 60,000*l.*—a goodly sum for our office to pay out of its 15,000*l.* a year.

The managing director goes on to say:—

“You might moor a good-sized buoy to the end, with a cage upon it to accommodate an observer. The cage should be of sheet-iron, and well padded with felt and blankets. You must have a tube for him to breathe through. He would have to guess at the state of the weather from the motion; perhaps a gas arrangement might be fitted to enable him to read off his instruments, and the advantage would be that he would probably find himself landed on the Irish coast, on an average, about once a fortnight, without any effort of his own. A sounding apparatus might be fitted, by which he might fix his intermediate positions.

“It would be well to get the experience of some of the Officers of the ‘Brisk,’ which was moored for six weeks, in some 70 fathoms, off Scilly. One of them on landing went to a lunatic asylum for some months.”

You will, therefore, have gathered, from what I have said, that the scheme of telegraphic ships is not very practical; and, in fact, that telegraphy from America, or from the surface of the Atlantic, has not been as yet of much service.

Admiral MACLEAR : Some people think we should look to the moon for our weather ; others think that the weather always comes from America ; but Mr. Scott has shown the difficulty of obtaining indications for our British weather from America or even from the Atlantic, which is more probably the place where our weather originates. But, failing the possibility of putting a man in a cage in the middle of the Atlantic to telegraph our weather, we might probably arrive at some results by improving our western stations for observing, and having well-trained men who have been accustomed to observe clouds and the smallest indications of a change in the higher regions of the atmosphere, and having well-equipped observatories, supplied with spectroscopes if that is considered necessary, and with a telegraphic communication every half hour, so that the men at these well-equipped observatories at our western stations should be able to say : " There is a cloud rising in the west ; that cloud is developing ; that cloud is doing so and so." In that way we should certainly get the earliest indication possible of the weather.¹ If I am not mistaken, the first synchronous charts were made of the great storm in August, 1873, and were published by the Meteorological Council in consequence of the effect of that storm. They published charts for the whole of August, 1873. That storm had its origin near Cape de Verde on the African coast. I remember it particularly, because I was not far off the birth-place of that storm in the " Challenger " at the time. We had nothing more than a fresh breeze, but that storm went across the Atlantic following the Equatorial current, turned at the West Indies, and up to Nova Scotia. As it passed over the Atlantic it developed into great proportions and astonishing violence. That storm cost 500 lives and an immense sum of money. A great deal of that mischief might have been prevented by a warning, had some of the West Indian islands been in telegraphic communication with America. That storm broke to pieces at Prince Edward's Island, off Nova Scotia. I do not think that many of the storms that originate on the coast of Africa and go across with the Gulf Stream eventually return to us. I fancy the Gulf Stream interferes very much with them. That stream begins as the Equatorial current and crosses the Atlantic from the coast of Africa to the West Indies, follows the coast of America, and goes back across the North Atlantic like a river, and that river has its eddies which answer to the depressions that Mr. Scott has been speaking of. I do not know what answers to the anticyclones and elevations, which move at a much slower rate, unless it is some obstruction in the path of the stream, but there is an aerial stream that goes across with the Gulf Stream and follows its motion very well. That aerial stream must be interfered with by the Gulf Stream off the Nova Scotian coast and also by the cold current that it meets there. Mr. Scott has mentioned a rather remarkable circumstance, viz. : that only one storm has been traced right across the world from the Philippines to Europe. One would have thought that in the higher regions of the atmosphere a great many more would have occurred, but no doubt the interference of the Rocky Mountains and other mountain ranges, and I suppose of the Gulf Stream, does prevent the weather coming right across in the lower strata, and what we have to deal with as regards British weather are the conditions of the comparatively lower regions of the atmosphere, which are affected by pressure and temperature over the Atlantic.

Admiral GRANT : I do not rise to criticize the paper, but I am rather surprised at hearing of the progression of the depressions, if I understood the paper right. I just wish to mention a very curious experience I had in February. Coming from the West Indies we entered a depression, barometrical reading 29.30 inches, and we kept that depression without any fluctuation of the barometer at all. There was no diurnal motion in any way. We carried it over 1,500 miles.

General Sir G. WILLIS : I only rise to seek for information. One point is, as Bermuda has been lately connected with the general telegraphic system, whether useful information cannot be obtained from the Bermudas as to the state of the weather, or rather, I should say, as to the state of the Trade winds in the central

¹ The Hon. Ralph Abercomby has pointed out in " Weather," p. 401, that cirrus often gives indications before the barometer does.

northern part of the Atlantic Ocean, because, judging from the analogy of the Eastern Ocean, if it were not for the disturbing quantity in having ways up to the north between Newfoundland, Iceland, and Norway, we should get pretty nearly as regular weather in the autumn and summer months in the western coasts of Europe as you have in India. I should, therefore, like to know whether it is found that the strength of the North-East Trade Wind, and its more or less northerly trend, which varies considerably and which affects our weather on the west coast of Europe, will enable you to forecast, more or less, whether our late summer and autumn will be a wet and stormy one, or a fine and sunny one. I merely ask this question for information.

Dr. ALEXANDER HERSCHEL: I daresay the point has occurred to Mr. Scott, in connection with the charting for a whole year, which he has described to us with such exceedingly interesting clearness from the collected weather records of the year 1882-83, that the circumstances which occurred then must have been similar to what are just now prevailing in relation to the phenomena of sun-spots. Seeing that at present we have just passed through a time of minimum activity of the sun's spots, and that some extremely abnormal weather conditions have at the same time been presenting themselves, it may be that the records of the year 1882-83, which have been so ably discussed, and so very instructively described to us, may also have presented some features which were abnormal ones then, in somewhat the same manner as the conditions of the weather during the past year or two have been anomalous. I have no doubt that the possibility of some such resemblance has already occurred to Mr. Scott, and it may very probably be of some future interest to keep the possibility in recollection. He spoke of a bar of high pressure reaching pretty constantly, in the later months of winter, from coast to coast across the North Atlantic Ocean, from the neighbourhood of the Azores to near the coast of Greenland; and, as similar high anticyclonic conditions have, for one or two years past, been very prevalent on the eastern shores of the Atlantic, in the late months of winter, perhaps they might be referable in some way to the minimum disturbance epoch of the sun-spot cycle.

Admiral COLOMB: Might I ask whether the Azores would be of any use for the purpose of obtaining information?

Admiral LONG: Having profited much by the forecasts of the Meteorological Office, I wish to ask whether it is considered that the changes of the moon are in any way connected with the weather; whether these disturbances do occur more often during the changes of the moon than at other times. We are told that they do in many of the old books. I know in the Pacific I have noticed frequently, along thousands of miles of coast, that, after the full and change of the moon, there will be a heavy surf. Perhaps Mr. Scott will kindly say if he thinks there is any connection.

Admiral LINDESAY BRINE: I will ask one question on a point that occurred to me on reading the lecture, and that I think must have occurred to most of us. The lecturer was drawing our attention to the manner in which a depression started in Florida in about latitude 30° , went up along the eastern American coast, across to Newfoundland, and thence up by Greenland, Davis's Straits, and also towards the coast of Sweden. That movement of the depression of the storm coincides almost exactly with the direction of the movements of the Gulf Stream, so much so that if you look at any chart of the Gulf Stream, its direction is precisely that which he showed us was that of the depression. I would ask the lecturer to tell us whether, at the Meteorological Office, they have found any ascertainable connection between the Gulf Stream and the barometrical conditions which cause the depressions and the storms. I will not say more, because I am sure he will tell us all we want to know upon the subject when he makes his reply presently.

Captain TIZARD: May I ask one or two questions? First of all as to the heights of the Andes and the Californian mountains, whether they have been well ascertained, because, if they have been, it shows that very little reliance can be placed on barometrical evidence of height? Another thing is, we see by the drawings, there an area of high pressure in the neighbourhood of the Azores, and an area of low pressure situated near Ireland. If we can obtain telegraphic information as

to whether any great alteration takes place in either of these pressure systems, would it enable a better forecast to be made of the weather in this country?

Major R. AP H. WILLIAMS: I should like to ask Mr. Scott one question. Is he satisfied with the stations from which the Meteorological Department receive their information? One generally hears that, though they get a certain amount from lighthouses and other places, which are thoroughly exposed to all the winds that blow, a good deal comes from stations which are in partly sheltered situations, and which do not really get the full force of the weather upon them. It is often said that one of the greatest wants of the Meteorological Department is some good observing stations to the north-west of these islands. The island of St. Kilda, which lies some 50 miles to the west of the Western Hebrides, might, I am told, be connected with them by a telegraph cable for some 6,000*l.* or 7,000*l.*, and so be brought into communication with the general telegraph system of the country. It is difficult to imagine a spot from which earlier and more valuable information could be sent. I am glad to think that there is now a prospect of all our lighthouses being connected by telegraph wires, and that we may get constant and frequent reports on all the natural phenomena, which they are ordered to observe, from the very intelligent and trustworthy body of men who are in charge of them. The lighthouses might be employed in sending constant reports to the Meteorological Department.

Mr. SCOTT, in reply: There have been a great many very cogent remarks made on the paper I have had the honour of reading to you. With regard to what Admiral Maclear has said, the only thing I shall refer to is one little slip which he has made, because the charts for the month of August, 1873, were not by any means the first daily weather maps of the Atlantic. The credit of having made the first such chart of the Atlantic is entirely due to Leverrier. He commenced with June, 1864, and for the last seven months of that year and the whole of 1865 he published such charts. With reference to the question of the progression of the depressions, it has been remarked that they move along the Gulf Stream, but it is much more correct to say that they go with the prevailing wind current. The prevailing wind current over the Atlantic in the middle latitude is from south-west towards north-east, and this seems to carry the depressions with it. As a general rule, you find that those depressions move with the prevailing wind current. We had a very striking instance of that over the British Islands last week, when we had two successive depressions coming straight down from the north of Scotland, right along our east coast, with prevailing northerly winds. General Willis spoke about Bermuda. The reports from Bermuda are telegraphed to Canada, and are used in the American weather system, but what we find is that owing to the length of time which any atmospheric changes require to come across from the United States to the coast of Europe, changes take place in the depressions themselves. For instance, a storm which may be very bad on the coast of America may die out before it comes across to us. Therefore we find we cannot trust any reports from isolated stations at such a long distance off, unless there is some means of connecting them by intermediate stations between the point of origin and ourselves. With reference to the very interesting point, as to whether the Trade winds affect our weather, and whether on the whole we can, from a knowledge of what is going on all over the Atlantic, forecast our seasons some months in advance; it is not the first time that that question has been asked, and the first answer that was given to it was given by Franklin. When he was coming from the United States to France in November, 1776, he found certainly a higher temperature of surface water on the track of his ship than he had expected, and, as he expressed it, traced the Gulf Stream right across to Europe; and he said that he thought that the fact of that warmer water existing over the Atlantic indicated a mild and wet winter for western Europe. Sir Edward Sabine took up the investigation afterwards on board H.M.S. "Iphigenia," in January, 1822, and came very much to the same conclusion, but the further investigations which we have been carrying on have not tended to show that you can really draw such conclusions as I have indicated. Sir Edward Sabine used to say that if we could get a regular record of the conditions of the weather close to the Equator, he hoped that it would be possible to predict six months beforehand what sort of season we should have, but certainly no investigations we

have been able to carry out in developing these ideas have yet led to any definite conclusions. Professor Alexander Herschel has asked me about sun-spots. I think the meteorologists would be exceedingly glad if Professor Herschel would give us any sort of rational connection between sun-spots and weather. We used to hear a great deal about this matter, but for the last nine or ten years we have heard very little indeed, and we cannot tell what the connection is. We know perfectly well that if we have abnormally cold weather there is not very far off from us an area which has abnormal warmth. Is it the abnormal warmth or the abnormal cold which is produced by the sun-spots? It has been shown over and over again, that whenever we have an intensely cold winter, probably the area of warmth lies somewhere over the Mediterranean, somewhere not very far off there is a compensating anomaly; and if you take the world as a whole the same general conditions of temperature exist. It is not possible to say whether or not the mere fact of our having very wet or dry weather is due to sun-spots when our neighbours not very far off have exactly the contrary. During the wettest weather we had two or three years ago in the summer, there was not a fish to be had in the north of Scotland; there was no water in any river there. So that a district so near to us as the north of Scotland was exceedingly dry, while the south of England was very wet. Last summer everybody was abusing the weather because of its wetness. I myself was then living in the Black Forest, and we had four days' rain in eight weeks. Which of these conditions depended on the sun-spots, was it my fine weather or was it the rain here? Admiral Colomb and Mr. Williams raised very much the same question about telegraphing from places where wires do not exist. All we find is that telegraphing is only possible if the connection is paid for commercially. M. Tietgen, the Chairman of the Store Nordiske Telegrafer Selskab in Copenhagen, which extends its wires from England to Japan through Siberia, has repeatedly come forward requesting that a telegraphic cable should be laid along the line which Sir Leopold McClintock surveyed, by the Faroes to Iceland, Greenland, and Labrador. M. Tietgen's Company is quite prepared to lay the line if each of the countries will guarantee him 2,000*l.* a year, but there is not a single country that will do that for pure meteorology. It is simply a question of money; unless a cable will pay commercially, it is hopeless to expect it to pay for scientific observations. It is the same case as to St. Kilda; the cable will not be laid unless it will pay commercially. We have got a cable extended to Belmullet on the coast of Ireland. How was it extended there? The police guaranteed half the cost, and the Meteorological Office promised to contribute a regular amount. Previously the police at Belmullet had to keep up a stable of horses in order to communicate with Ballina or Castlebar, a distance of about forty miles. Sir Robert Hamilton, then in Dublin, arranged the whole matter with us, and it was settled that if we would pay 3*s.* or 4*s.* a day, that is, if we guaranteed a certain number of messages per day, the Post Office would establish the line. The whole question of telegraphy from outlying stations depends on that point; there must be a certain rental guarantee to the Post Office, or they cannot lay down the wires. One gentleman asked about the moon and the weather. It is very curious how long these things last. One thing is quite certain, that the changes in the moon take place simultaneously over large areas, but storms do not take place simultaneously. If a storm coincides with the change of the moon on the west of Ireland, it does not coincide with it in England. I have often heard it said by Officers who have been stationed off the coast of Australia that we have very little idea of the effect of tides, and of the immense area of coral reefs, that are left bare at low water at spring tides, and the intense action of radiation, all tending to produce changes of weather. But all these things are not sudden, they are gradual, and they certainly do not produce sudden changes of weather. I have referred to Admiral Brine's remarks about the direction of the storm coinciding with the Gulf Stream. Captain Tizard asks whether the heights of the Andes and Californian Mountains have been determined. The height of Pike's Peak has been determined, and of Antisana, the height given is not that of the mountain, but of the observing station on its side. As far as it is known, those heights have been clearly and absolutely determined. He also spoke about the telegraph from the Azores, but that, too, has not been floated commercially. I think that nearly finishes the matter, excepting as to the

question of getting additional information from the lighthouses. We find a good deal of difficulty in organizing even such a very simple thing as getting our temperature observations from the lighthouses. Some of the men are pretty good, but some of them are not. They used to say that no man with much brains in his head would ever go into a lighthouse; he would be driven mad by the monotony of staying inside, with the bright light inside and a gale blowing outside. We do not find that they are really as trustworthy as we could wish. I will give you an instance. There was a light-ship struck by a meteoric stone some years ago. The stone burst on board, and the men felt the fragments under their feet on the deck; they washed them all overboard next morning. The stones were worth nearly their weight in gold, but the men washed them out into the sea.

The CHAIRMAN (Captain Wharton): We have to thank Mr. Scott very much for his most interesting *résumé* of this, to us, very interesting subject. One point which he has brought before us very strongly, and which it is very necessary for anyone to understand who wishes to comprehend our complicated weather, is that there is no difference between a storm and a depression; that if the depression of the barometer in the centre of an area is slight as compared with the pressure outside, you will have a comparatively light wind: if it is great you will have a strong wind; but how you are to tell whether a small depression is going to develop into a large one, or whether it is going to die away, is just the point which baffles, so far, all calculation. And that is the great difficulty in attempting to forecast: the changes are so rapid, and are, so far as we know, so complicated, that we cannot understand them. Therefore there must always be a considerable amount of doubt as to whether the forecast is correct or not. A storm coming from the Atlantic, racing in, as Mr. Scott has described, after a two days' passage of the Atlantic, will sometimes stop dead short of the British Isles, and play about, so to speak, over the north coast of Ireland for two or three days after having raced in. All these things form the subject of daily examination and record; but meteorology has not been in existence long enough to enable anybody to attempt to forecast those circumstances. It is in that that lies the, so far as we can see, impossibility of forecasting seasons long beforehand. The more you study our meteorology, the more you see that our weather depends upon little local circumstances—whether the depression takes a little turn to the north; whether it takes a turn to the south; whether it stops, whether it goes on. Those are the circumstances that really affect our weather. We all know that there are seasons of general warmth or general cold. We should much like to know—and we try to discover—the causes of such seasons. But although there are certain weather prophets who are bold enough to give us weather a great many months in advance, you cannot expect any serious meteorologist to enter into such wild prophecies as those. The forecasts of the Meteorological Office must be founded upon, so far as we can have them, sound grounds. I slightly differ from Mr. Scott in one point; but perhaps we are thinking of two different things. I am thinking of what Dr. Herschel said about sun-spots. Here in England I do not believe you will ever be able to trace any connection between weather and sun-spots, for the reason that Mr. Scott gave, viz., that the weather is so variable over small areas; but I am a great believer myself in the direct effect of the condition of the sun on the weather in more settled regions. The great series of observations on the cyclones of the Indian Ocean, to which Dr. Meldrum has devoted his whole life, and the data that he has collected, show, to my mind, most incontestably, that in large areas where the ordinary circumstances of the weather are extremely regular and quiet, there is distinct connection between disturbances and sun-spots. In our latitude, where weather is so much upset by constant local disturbance, I do not think that any connection will be made out. There is also another point in which I differ a little from Mr. Scott: that is, the physical possibility of having a ship moored in the Atlantic. It is a very favourite vision, I think, with everybody who knows, that a large part of our weather comes from the Atlantic; and, although the result of the "Brisk" is not very encouraging, a great deal depends upon the form of the ship: how far she will be uneasy or bearable in a storm; and I may mention, as a proof of that, that two years ago, and the year before that, when the entrances to the British Channel, south of Ireland, a long way west of Scilly, were being

re-sounded, the little "Research," a small paddle steamer, rode out three very heavy westerly gales in 70 fathoms of water. It was not very pleasant on board, but nobody went into a lunatic asylum. It was simply ordinarily reported as a circumstance that had taken place, without any idea of there being any particular hardship in it. The ship only pitched, and I thought it was a very encouraging circumstance, and I do not see why, some day in the dim future (I do not suppose I shall ever live to see it), when there is a good deal more money available than there is now; when we have solved the difficulty of keeping the cables clear of the anchors, and when we know more about meteorology, and the value of it is assured, we should not have such a ship. You will all agree with me, I am sure, in thanking Mr. Scott very heartily for his lecture.

Friday, March 25, 1892.

GENERAL SIR DANIEL LYSONS, G.C.B., &c., &c., Constable of the
Tower of London, in the Chair.

MILITARY BAND ORGANIZATION.

By Colonel T. B. SHAW-HELLIER, Commandant, Royal Military School
of Music, Kneller Hall.

DELIVERED IN THE BANQUETING HOUSE, WHITEHALL, AND ILLUSTRATED
BY PERFORMERS FROM THE KNELLER HALL BAND.¹

THE subject of military music has of late years been so prominently before the public, that it is felt that for its introduction here, no apology is necessary.

Of the history of the subject, or of the connection between music and the military profession, it is not intended to speak. Suffice it to say, that the military band has become an integral part of every regiment or battalion, not only in the Army of this country, but in those of every civilized nation throughout the world. And, indeed, the use of music serves not only as a powerful mental stimulant to the soldier, but, by rendering the Service popular with the classes, it acts as an incentive to recruiting.

When soldiers hear the martial strains of a band playing, perhaps old national airs of their country and of their childhood, it arouses their patriotism. Love of home, Queen, and country asserts itself; *esprit de corps* is fostered and encouraged to a degree far greater than is generally recognized; and troops can by these means be aroused to a pitch of enthusiasm that, without music, would be impossible. I do not say this as an enthusiast—it is a simple fact, and one that our greatest Generals are well aware of.

Here in England, where we have the opera, the concert-room, and the theatre within easy reach, we little know the benefits good bands confer upon the Army, and more especially when upon foreign service, whether on the line of march, in the field, or in camp. The tired soldier forgets his troubles when he hears the band, and it goes a long way towards keeping up his spirits and making him cheerful, contented, and happy. With troops in such a frame of mind how much can be done! How many operations can be successfully carried out that with despondent or half-hearted troops could only result in

¹ The lecture and music were highly appreciated by a large audience in the Banqueting House.—ED.

failure! The value of music as a means of arousing men's passions is very great. The great Napoleon well knew this, and invariably took care that the bands of La Grande Armée should be well cared for. And the average private soldier, however innocent he may be of so-called classical music, yet *does* appreciate *good* music, and in those regiments where the band plays in public, for the benefit of the men, and the soldiers are allowed to bring their friends, sweethearts, and wives, proof of this will never be wanting, for there will always be a full and appreciative audience. And so I contend that effective military bands—those orchestras of the soldier and people—are able to do good service, even if they only provide a wholesome recreation, and develop a taste for innocent and intellectual amusement, in the enjoyment of which the soldier and the people may mix freely.

Military music, then, being an integral part of the organization of the army of a civilized country, it remains for me to sketch the present state of the military band in England, and also to bring forward certain suggestions as to much-needed reforms and improvements.

When the Royal Military Exhibition of 1890 was first proposed, I was requested, as Chairman of the Musical Committee, to provide for the performance of varied programmes of popular music in the grounds of the Exhibition. As this seemed to us to offer an opportunity, probably unique, for enabling the public to judge of the capabilities of our best military bands, we thought that by the introduction of music of a higher class into the programmes, and by arranging for a constant succession of different military bands, brought from all parts of the kingdom, much good might accrue. Thanks to the kindness and approval of H.R.H. the Commander-in-Chief, we were enabled to carry out the plan.

During the time the Exhibition remained open, no fewer than seventy-four different military bands were engaged, most of them remaining in the metropolis for a week. By these means it has been possible to form a very fair idea as to the general state of military music in this country, and, in addition, to gain a considerable amount of knowledge as to the working of our present system—its merits and its demerits—which it would otherwise have been impossible to obtain.

As the development of military music is, like everything else in the Army, rapidly progressing, it is becoming more than ever necessary that military musicians should be in accord and touch with the musical profession; and also that their career should, from a professional point of view, offer material advantages.

The present organization of a military band is as follows:—

- 1 Bandmaster (ranking with sergeant-major, but junior).
- 1 band serjeant.
- 1 corporal.
- 20 musicians.

In addition to these there are usually about eight boys who are learning to become musicians.

In almost every regiment or battalion there are also about ten or twelve private soldiers, old bandsmen that have joined the ranks for the sake of promotion, who, for the love of music, *in addition to their ordinary duty*, voluntarily play in the band, and are known as "extra bandsmen." The number of efficient players is thus raised to about thirty-six to forty. These "extra bandsmen" (who only play when the band are playing in public, not on parades), although not officially recognized as bandsmen, nevertheless exist in every regiment; indeed, were this not the case, no band worthy of the name could exist.

Our military bands are usually recruited in three ways—

1st. By means of boys who are trained to play certain instruments and can be enlisted from certain schools, such as the Duke of York's School, and others of which the War Office issues a list for the guidance of Commanding Officers.

2nd. By men who volunteer from the ranks to join the band. Perhaps, of these, one in ten is found after some six months' trial—involving constant attention and labour on the part of the Bandmaster—likely to become of any use.

3rd. By professional musicians who are specially enlisted, but who nevertheless are required to pass the usual soldiers' drills and tests, and are not allowed to join the band at once, but are kept at gymnasium, drills, &c., for at least six months before their services can be utilized by the Bandmaster. The number thus enlisted is of course for that reason very limited.

With regard to the enlistment of the boys, the choice of them should be left—subject to the approval of the Commanding Officer—in the hands of the Bandmaster. He could then get his vacancies filled by thoroughly efficient pupils, who already know something of their instruments, and his time would not be wasted, as it is now, in trying to teach boys who, musically speaking, are often useless. As it is, bandboys are frequently sent to regiments under orders from the recruiting department; the Bandmaster has no means of seeing them before they join, and they not unfrequently turn out useless, absorbing vacancies which might be filled by good players, if chosen regimentally. For example, in one regiment I know, during the last year and nine months, some eight or nine boys were thus posted. None of them knew a note of music, or played any instrument. This is by no means an isolated case, and it is one of the greatest hardships that our military bands are subjected to. This system should be changed, and the selection of bandboys be left either to such competent authority as the Royal Military School of Music, or to Bandmasters of regiments themselves.

It is, therefore, evident that the Bandmaster must virtually create his own material, musically speaking; and in order to do this it is more than ever necessary that he should be a man both of high educational attainments, and also of a social position considerably above that of his men. A short explanation of the system which obtains at present will here be of advantage.

As the regulations now stand, the post of Bandmaster can be obtained by any good military musician, not under the rank of sergeant,

who passes the necessary qualifying test at the Royal Military School of Music, Kneller Hall. He must, before he is allowed to proceed there as a student, have had *seven years' service* as a musician and be a sergeant. It has, however, been found advisable, in certain cases, to recommend a relaxation of this rule. He then passes before entrance a test examination. The course of study at Kneller Hall lasts according to the ability of the student, who has to pass a further test before he is promoted to Bandmaster, and is sent to join a regiment as such.

A few words about the Royal Military School of Music. Founded in 1857, by H.R.H. the Commander-in-Chief, it has, I believe, fully attained the position H.R.H. anticipated. Kneller Hall is now a most flourishing institution and gives as good a musical education in *its own particular sphere* as can be had at either the Royal Academy of Music or the Royal College of Music. The sergeants training for Bandmasters take on the average two years to qualify for their position, and the boys eighteen months for regimental musicians.

As Professors, we have some of the leading artists: Messrs. Clinton, Egerton, and Martin, for the clarinet; Mann, for the horn; Varness, oboe; Barnard, piano, organ, and string instruments; Cousins, bass, euphonium, and trombone; Radcliff and Oldham, flute; and Hardy, bassoon.

The qualified students act as assistant masters and see that the pupils work up the exercises set by the Professors.

After the students pass the final examination, the papers for which are set by public examiners, viz., Dr. Bridge, Messrs. Kappey and Sommer, and carried out by the Educational Department, they come on the roster for conducting the band, and are most carefully instructed in this art.

Work commences at 9 A.M. till 6 P.M., two hours for dinner and recreation at mid-day, and one hour for recreation 4 to 5 P.M. A voluntary class for string practice is held from 6.30 to 8 P.M.

This Institution might with great advantage be much enlarged, and should be made a *depôt* for regimental bands. Of course this means a certain outlay for increased accommodation and a larger staff of Professors, but in the end there would be a great saving to the public. The boys would be selected from the best schools, and I have no doubt that many of our professional musicians would send their sons into the Army when they knew what a superior education they would get if sent first to Kneller Hall; and, when they had become proficient, be transferred to some regiment where they would be well clothed, fed, and able to put money by, with the prospect of promotion and a pension, instead of, as is often their own case, grinding away to the very end of life, relying on some benevolent society for a pension they can barely exist upon.

There is another point that I would bring to your notice in the organization of the band. As, no doubt, most of you are aware, the bandsmen are borne on the strength of the eight various troops or companies, and to their different Captains look for promotion, pay, clothing, &c., the Bandmaster, except in matters musical, being a

mere cipher. It is a well-known fact that most of our successful musicians have a strongly developed business capacity, and this faculty is, I believe, found rarely wanting in musicians. It seems, therefore, more reasonable to give the Bandmaster entire control over his band, and to organize the band for administrative purposes *as a separate company* under the Bandmaster, who would be directly responsible to the Commanding Officer or other Officer appointed by him. The position of the Bandmaster would then be considerably strengthened; his men would look to him as the private soldier looks to his Captain, viz., their real head, both as regards music, discipline, pay, and promotion; and his position, a more important point than at first appears, would be improved both socially and regimentally.

To this rather radical change some Commanding Officers of very conservative ideas might object. Some Bandmasters would also deem it unpalatable, and the more lazy would dislike the extra responsibility. But yet, on the whole, the *ultimate* result (I do not say *immediate*) would be to place the Bandmaster in a more dignified and responsible position. The men consequently would have more regard for him, and his task would, *ipso facto*, be more congenial and in many ways smoother than at present. The post of Bandmaster would then offer inducements to such men who under existing circumstances prefer to become in time cathedral organists, conductors of large orchestras, or musical directors of our leading theatres; competition in the musical world has, however, become so severe that, of those who have studied at the Royal Academy and Royal College of Music, many serve but to swell the ranks of a profession much overcrowded, and to increase the numbers, already in excess, of underpaid organists and teachers of music to whom existence is a struggle. It would be well, therefore, if the authorities of these institutions would inquire into the advantages offered to the military musician. I shall only be too glad to give them every information, and hope they may see their way to recommending students of military inclination to join the Army, with the hope of attaining the position of Bandmaster; for a Bandmastership in the British Army is a post that any gentleman might be proud to hold. I should be glad to welcome musicians of this stamp into the Service.

The principle of perpetual interbreeding is considered bad for rearing sound stock, and stock thus bred is liable to deteriorate. Does not this hold good in art? Of course it does. So I would welcome these youths, as it would cause both greater stimulation amongst military musicians generally, and would introduce into many band rooms an element of wholesome and artistic competition greatly to be desired.

As things now are, a Bandmaster seldom has his band together even during practice hours. Men are continually taken away for trivial company details even in the best managed regiments. Commanding Officers, however careful they may be, cannot always prevent friction between troop sergeant-majors or colour-sergeants and the Bandmasters or bandsmen. Such small annoyances fall to the lot of almost every Bandmaster. Were he to complain, as he often

might with good reason, he would probably be made to feel it in other petty ways, and so he usually remains silent, wisely determining discretion the better part of valour.

By the adoption of the separate company system, therefore, all these petty annoyances—and I speak with a considerable, I might perhaps be allowed to say possibly *unique*, knowledge of the subject—would be obviated entirely.

It has been contended that were a band organized as a separate company in the way that I have proposed, a number of men would be lost to the ranks for fighting purposes. I submit that the recognized duty of bandsmen on service should be to act as “first aids” to the wounded. How our recent small wars have amply proved that our hospitals and Medical Staff are, from want of men, greatly handicapped in this respect. What, then, would be the case in a great European war? With the increased range of the rifle, and the adoption of the machine-gun rapidly becoming universal, I contend that, unless largely augmented, our Hospital Staff would find it very difficult to cope with the additional work. And this is how I propose to make practical use of the bands. To be efficient, a band should contain at least thirty musicians (irrespective of boys and learners), two corporals, and two sergeants. They should be at all times an administrative unit under the actual control of the Bandmaster, and should be armed with revolvers and swords. They should be taught to use these weapons, and should undergo an annual course with each. Every bandsman ought to have a certificate from the Medical Officer as a qualified “first aid” to the wounded; they should be instructed in stretcher bearing, and should be annually inspected in these duties by a Medical Officer. As bandsmen are of necessity men of good education, and, by reason of their profession, of manners probably more gentle than those of the average private soldier, such employment would do much to relieve the wants of a regiment in time of war, when the Hospital Staff is almost always too hard worked and much undermanned. A number of men thus trained, closely united by that feeling of *esprit de corps* and *camaraderie* which exists perhaps more strongly among bandsmen than among the generality of soldiers of the present day, would be a most welcome and valuable adjunct to a battalion upon active service.

A comparison with the system of military bands that obtains in the German Army will here be of interest.

An average German military band is thus composed—

- 1 Bandmaster (Stabshaubist. Sometimes called Musik Director or Kapellmeister).
- 10 Musicians (hautboisten).
- About 36 assistant-bandsmen (hülfsbautboisten).

The Bandmaster has the relative rank of a sergeant-major (feldwebel), and is the *immediate superior* of the band (for discipline as well). The ten hautboisten have the relative rank and pay of unter-officier, a rank, in this case, somewhat equivalent to our lance-sergeant, as they are allowed to wear the badges of rank as sergeant.

The hülfshautboisten or assistant-bandsmen enter as privates for three years, which period may be, and usually is, prolonged; and they may be advanced to the rank of "gefreiter" (somewhat like our corporal); in case of vacancies occurring among the ten hautboisten, they may be promoted to fill them. They may, however, be allowed, at the discretion of the Officer Commanding, to wear the badges of rank of an "unter-officier," as a purely honorary distinction. In all cases, rank in the bands is, as has been stated, relative rather than executive.

Every encouragement is afforded for the bands to play in public, and the men are allowed to accept private engagements, when not detrimental to the performance of their military duties: the moneys received in these cases are considered as the natural perquisites of the bandsmen, who are recognized as musicians *first*, soldiers *afterwards*, yet none the less soldiers; all advancement, however, is for *musical* excellence, as it should be. Consequently, each man individually strives his utmost to excel and to increase his musical knowledge. The relative value of money in Germany being less than in England, I do not enter into detail as to the pay or emoluments of the Bandmaster or bandsmen. It may suffice to say that a system somewhat akin to that in our own Service prevails, the Officers *all* subscribing a certain amount, which varies in different regiments, towards the band fund. The subscription, I believe, is fixed by the Colonel of the regiment. There is also a fixed contribution from what is known as "the reserve fund" of the regiment; and this is sometimes augmented by grants from other regimental funds at the disposal of the Officer Commanding.

As a further contrast, let us examine the constitution of military bands in France.

A full regimental band in the infantry of the line and the artillery consists of:—

- 1 Bandmaster (Chef de Musique).
- 1 Assistant-Bandmaster (Sous-Chef de Musique).
- 30 Musicians (musiciens).
- 15 Assistant-musicians (élèves).

In cavalry and rifle regiments, the band is thus organized:—

- 1 Bandmaster.
- 1 Assistant-Bandmaster.
- 22 Musicians.
- 15 Assistant-musicians.

These numbers, except in the cavalry, do not include the trumpeters, drummers, and buglers of the regiments. In the cavalry regiments, the trumpeters are borne on the strength of the band, in which they play some instrument, when off duty as trumpeters.

The bandsmen have a special relative rank, akin to that of lance-corporal. The assistant-bandsmen (élèves) rank as private soldiers.

The Bandmaster ranks as a Sub-Lieutenant, and is therefore a Commissioned Officer. After ten years' service as Bandmaster, his pay

is increased, and he ranks as a Lieutenant. The rank is, however, *relative* and not actual. The Assistant-Bandmaster ranks as "adjutant," a rank in the French Army almost equivalent to our sergeant-major, and not to be confounded with "Adjutant" in the English Service. Assistant-Bandmasters and Bandmasters are appointed, as vacancies occur, from musicians selected from the various regimental bands, who have been successful at a competitive examination in theory of music and instrumentation, held under the auspices of the Paris Conservatoire, there being no institution in France corresponding to Kneller Hall. The candidates must possess, in addition to their theoretical knowledge, the faculty of imparting instruction, and have also a practical acquaintance with every instrument used in a military band. They must, of course, have satisfied the authorities that they are educated men and socially fit for their position. I may here mention that about the year 1884 several distinguished German Officers visited Kneller Hall, with the result that the German Government have established a school of music somewhat similar to Kneller Hall for training their military Bandmasters, feeling that it is essential that they should be specially trained, and that an ordinary musician has not got that special training which is necessary for efficiently teaching the younger instrumentalists, as well as leading a military band.

Bands in the French Army are managed, as with us, by a committee of Officers in each regiment, and are supported by a Government grant or "maintenance fund," which is augmented in various ways such as by subscriptions from the Officers and from other regimental funds at the discretion of the Commanding Officers of regiments.

The question of pay and pensions in France I do not propose to examine, since in an army recruited by conscription a fair comparison is obviously impossible. It is, however, well to say that every encouragement is afforded by the authorities for the bands to play in public places for the amusement of the people, and inducements are held out for the men to accept private engagements when compatible with their military duty. And so in provincial towns the military bands take the place of local orchestras where none exist; and since music is more generally appreciated there, the military musician is socially in a position far higher than that held by the average private soldier.

Time, unfortunately, does not permit of a detailed examination of the state of military music in Austria, Russia, Italy, Spain, Belgium, or other countries. It may suffice to say that in these countries the military band is a recognized adjunct of every regiment, and that the bands, as a rule, are never less than forty strong. Indeed, in Austria and Spain especially, they frequently number as many as eighty performers, the Bandmasters often being men of note in the musical world and artists in every sense of the word; consequently, every inducement is afforded by the authorities for capable musicians to take service.

Let us now examine the pay and emoluments and pensions of the Bandmaster and men of the British Army. They are as follows:—

	Daily pay.	Allowance from band fund.	Average season's engagements, concerts, &c.
Bandmaster	5s.	Yearly £70	About £28 0 0
Band-sergeant	2s. 4d.	Someregiments	„ 7 16 0
Band-corporal	1s. 8d.	and battalions	„ 4 15 0
		allow 10s. per	„ 4 12 0
Bandsmen.....	1s.	month to the	„ 3 4 0
		band sergeant,	„ 2 1 0
Additional for each good		and extra pay to	
conduct badge obtained		a limited number	
respectively after 2, 6, 12,		of bandsmen; the	
18, and 20 years' service..	1d.	soloists usually	
		receiving 3d. per	
Extra bandsmen	1s.	diem, and eight	„ 1 9 0
		or ten others of	
Additional for each G.C.		the best musici-	
badge, as above	1d.	ans 2d. or 1d. per	
Boys	8d.	diem, according	„ 1 9 0
		to merit.	

These rates of pay are exclusive of quarters, fuel and light, rations, and uniform.

The band-sergeant is subject to a deduction of about 7d. a day for his messing; the corporals and the men and boys to a deduction of 3d. a day. In the case of married men this deduction is not made. And in the event of one of the recommendations of Lord Wantage's Committee upon recruiting being acted upon, these deductions will cease to be made.

With regard to the allowances from the band fund, they vary in different regiments. The Bandmaster, however, receives 70*l.* per annum *by regulation* in every corps.

The engagements vary at different stations. Those given here represent the average of the band of an infantry regiment at a large military station in the south of England. In some places, where there were no other bands stationed, they would be considerably more, and in others perhaps less; always greatly depending upon the energy and efficiency of the Bandmaster, and the support accorded to him by the Commanding Officer. With bands such as the Royal Artillery, Royal Engineers, Royal Marines, and the Guards, the engagements would of course be worth infinitely more.

In stationary bands bandsmen can also increase their earnings by accepting private engagements, such as playing at dances, evening parties, and in the orchestras of the opera and the theatres.

The pensions obtainable by military musicians are as follows:—

	s.	d.	
Bandmaster; after 21 years' service (five years of which he must have been a warrant officer) ..	3	6	per diem.
Ditto, after 25 years' service, ditto	4	0	„
Ditto, after 30 years' service, ditto	4	6	„
Band-sergeant, after 21 years' service (12 years of which he must have been sergeant)	2	3	„
Band-corporal, after 21 years' service (12 years as corporal)	1	8	„
Bandsmen, after 21 years' service, <i>nominally</i> as corporal if enlisted at 18 years of age	1	6	„

As the present pension warrant is interpreted, it is impossible for any bandsman to obtain the maximum pension, since it requires twenty-four years' service before obtaining 1s. 8d. per day. Hence a boy enlisting at 15 years of age must be made a full bandsman at once in order that he may complete twenty-four years. Then three years' boy service deducts $0\frac{1}{2}d.$ per day for each year, so that the maximum pension is *really* 1s. $6\frac{1}{2}d.$ This is so clearly an injustice that common fairness demands its removal.

And here it might be mentioned that, although the private soldier may one day hope to rise to commissioned rank, yet this is denied to the bandsman or Bandmaster, who can never hope to become anything further than a warrant officer. Consequently when a student has left the Military School of Music, and has been appointed to a regiment as Bandmaster, he has reached the *acme* of his profession. He is subjected to no proper supervision, except, indeed, as regards discipline, and his band may be *the best* or *the worst* in the Army. He probably begins by being very keen, and works hard at his band, but, musically speaking, no one find faults where necessary, or encourages him with judicious criticism when he most needs it. Few Commanding Officers know how, and many do not care thus to interfere with their Bandmaster, fearing perhaps to display ignorance of matters musical. The want, therefore, of efficient musical inspection for military bands is evident to all who know what they *ought* to be and what they *might* be *with no extra cost to the public*. Were there such supervision exercised (at all events over bands in the United Kingdom), and the industrious Bandmaster given the hope of eventually rising to commissioned rank, how different the military music of the country might be. The Bandmasters of the stationary bands, such as the Royal Artillery, Royal Engineers, Royal Marines, and the Household Troops, ought, by reason of their responsible positions in the musical world, to hold the relative rank of Lieutenant. As vacancies for these appointments occurred they should be filled by the promotion of other selected Bandmasters from the Army who have shown proficiency, industry, and artistic excellence as displayed both by their work, their teaching, and the *ensemble of their bands*. Thus encouragement would be given to the younger Bandmasters of the Army to work, and these prizes could be within their grasp. Indeed the improvement of military music should be regarded, not only as a

purely military question, but also from a national point of view. The class of music common in ordinary programmes of military bands might be improved. The occasions on which they perform render this, perhaps, difficult, although not impossible, of accomplishment. One fact is, however, pretty clear, that is, that existing circumstances prevent the *public* from hearing our fine military bands as often as they might. Here in London, for example, are six of the finest military bands in the world; and there are within easy reach some fifteen to twenty others, and yet when do the public ever hear them? Do they ever play in the parks, or anywhere where admission is not charged? Surely some action might be taken, and it might be found possible to encourage military bands to play in public, and to accept such engagements as were offered by the London County Council, and were virtually going a-begging last year. More frequent opportunities, and perhaps more *responsible* opportunities, would have the effect of awakening the consciences of those in command. In the selection of the programmes there would be no occasion to prefer music of a *heavy* nature; the public ought to have variety, but artistic lines should be drawn in the selection of the music. Were such programmes noticed more freely by musical critics and in the daily papers it would have a good result.

To improve our bands, then, it is necessary to raise the position of the men. At present I might almost say that Dante's inscription over the gates of the Infernal Regions might with good reason apply to the band-room, as regards prospects of promotion, "All hope abandon ye who enter here." Out of all the number there is one sergeant, one corporal! Why should an intelligent man remain? What hope has he of promotion? In one band I could name three men who *left* the band are now Quartermasters; ten others who left hold far better positions than it would have been possible for them to obtain by remaining.

Let the number of the bandsmen be raised to thirty, and let them be classified, the 1st class wearing the decorations, and holding the relative rank of sergeant; the 2nd class, of corporal; and the third, of lance-corporal, promotion from one class to the other being for musical excellence and good conduct. The characters of the musicians would soon show an astonishing improvement.

Bands being placed upon a special footing and organized as administrative units, treated as professional men, would attract men of artistic feelings to enter them. Obtaining their education free, the country would have a right to expect a prolonged service, which would in the case of bandsmen be for at least fifteen years, and for full pension twenty-four. Performers would then have a motive for improving themselves, and our military Bandmasters would soon be among the most eminent musicians of the day.

Many of our young artists, often in the most extreme poverty, would gladly embrace the career of a military musician, and would work and study with the zeal and ardour that talent exhibits when properly encouraged. They would then find in such a career all they could desire, personal consideration, the honour due to artistic skill,

and the prospect of rising and making a name for themselves in their profession. May this prove one of the fruits of Her Gracious Majesty's most happy reign.

To recapitulate briefly, I would submit that if the following suggestions were carried out, *while no extra expense would be caused to the country*, our military music might be brought to a degree of excellence greatly to be desired.

1. Bands to be organized as separate companies; the men to be considered *first* as professional musicians; soldiers afterwards, *yet none the less soldiers*.

2. The bandsmen to be augmented to thirty in number, and to be arranged in three classes. The effective non-commissioned officers to have relative rank as follows:—Band sergeants as 1st class staff sergeants, band corporals as troop sergeant majors and colour sergeants. Musicians of the 1st class to have the *relative* rank of sergeant; of the 2nd, that of corporal; of the 3rd, that of lance-corporal: the pay, however, to remain as at present. All promotions in the band to be made at the recommendation of the Bandmaster, and for *musical excellence* and good conduct.

3. To give commissions to the Bandmasters of our stationary bands, and of the Household Troops. These appointments to be filled up when vacancies occur, as at present, by other Army Bandmasters, promoted on account of their artistic strivings and work, as shown by the *ensemble* of their bands and general teaching. Let the Bandmaster's responsibility be balanced by his power and privileges. Increase his authority over his men, and his moral influence will be what it ought to be.

4. To lengthen the time of compulsory service for bandsmen to fifteen years, and for full pension, twenty-four.

5. That our military bands play more in public places, for the benefit of the public, and that our military musicians be encouraged to accept orchestral engagements when possible. This will bring them more among the musical world. Interchange of professional ideas is always beneficial, no matter what trade or profession a man may follow.

6. When practicable, some musical supervision over military bands—I do not mean *interference*. The knowledge, however, that at any moment their bands were liable to be musically inspected would often keep young Bandmasters up to their work, and prevent their lapsing into idleness.

7. Bandboys to be selected either by Bandmasters of regiments, or by the Military School of Music. Commanding Officers should have the power of discharging at once any bandboys reported as being incorrigibly idle, or musically incompetent, and therefore unfitted for the band.

And now, perhaps, I may be asked, "Why make this stir about bandsmen?" Who, I may ask, are generally the best shots in a regiment, the best cricketers or football players, and who make the best non-commissioned officers? Who are the life and soul of regimental amusements; the mainstay, in fact, of *esprit de corps*? Why!

the band. Usually "nobody's children," belonging to every company in the regiment, and commanded by half a dozen different Captains, not to mention the Band President or the Adjutant, the only wonder seems to be that, with our present organization, our bands are as good as they are. We have excellent material, we have the ability and the capacity for work, and yet, *with no additional expense*, our bands might become the finest in the world. Our motto should be, "Dum spiro spero." May I be excused if I say it is too often "Dum spero *spiro*" (often out of tune).

Military Music.

Time will not permit me to go into the subject of military music; but I hope on some future occasion to read a paper on military music, illustrated by the Kneller Hall Band; therefore I will only give a short introduction before the band plays the several pieces I am enabled to produce.

I have to express my thanks to Colonel Bowdler Bell, Captain Day, Captain Mahony, Lieutenant Griffiths, and the authorities of the British Museum for much valuable information, also to the Rev. Mr. Galpin, Messrs. Mahillon, of London and Brussels, Messrs. Rudall and Carte, and Messrs. Boosey, for so kindly lending me some of the ancient instruments for the production of the interesting music which is now to be played.

I. March, "Des Lansquenets," 17th century. 8 flute douces and 1 drum.

II. March, "Brussels Municipal Guard," 17th century.

The instruments are 2 cornetti, 3 hautbois, 3 cors Anglais, 2 bassoons, 1 trombone, and drum.

III. March, "De Lully," 18th century. (Lully.) 4 hautbois, 3 cors Anglais, 3 bassoons.

IV. Gavotte, "Louis XIII." Same instrumentation.

V. The next march, I found the parts at my own home, where they have been hidden away for over a century. It is called "Elliott's Light Dragoon March," and arranged for 2 cornetti, 2 horns, 2 bassoons, 1 serpent, and kettle drums. These instruments are of the same period as the march, 18th century.

VI. "March of the 13th Regiment": German. This march is copied from a book published before 1771. On the title page appears the following paragraph:—

"The several German Regiments these Pieces belong'd to never intended they shou'd appear in Print, but one of the principal musicians quitting the Service, who had copys of the books belonging to the different Bands, thought it wrong such excellent music shou'd remain in Obscurity. For the delight and Amusement of Lovers of Martial Music and Good Harmony he has made them Public." I have chosen what seemed the best, and feel sure you will appreciate this Excellent Music and Good Harmony.

VII. Marches (slow and quick), Body Guard of King Louis XIV, 18th century. 8 trumpets in D, kettle drums.

VIII. March, band of the Hundred Guards, 18th century. 6 flutes 1 drum.

IX. March, Foot Guards, 1760, I obtained at the British Museum and verified the instrumentation from an old print.

2 clarinettes, 2 oboes, 2 trumpets, 2 horns, 1 serpent, 1 bassoon, tambourin, triangle, cymbals, 1 kettle drum, 1 bass drum, and jingling johnny.

X. "Prince Edward's March," same date. 2 small clarinettes, 2 trumpets, 2 horns, 2 bassoons, 1 serpent, 1 ophicleide, 1 tenor drum.

XI. "The 4th Dragoon Guards' March." This march was composed by Eusebius Hull.

According to a pianoforte score, 2nd edition, which was published before 1832, it was performed with the most rapturous applause at the Theatre Royal, Covent Garden, also at the Theatre Royal, Dublin.

I have the score of this march, arranged by Mr. Eckersburg, who was sent over by Mendelssohn, to whom Colonel Chatterton had written to get a Bandmaster for the 4th Dragoon Guards; this arrangement was finished in 1840, and I think you will all agree that it is a most admirable piece of scoring, and that the old march sounds a deal better in its old than modern dress.

The score is for 2 cornopeans, 7 trumpets, 4 trombones, 1 ophicleide, and kettle drums.

XII. March, Quick step. (Lieutenant Griffiths.) Specially written for this occasion.

Trusting that I have not wearied you, and that advantage may accrue to the bands of the Army from the suggestions I have brought forward, the band will now play as a *finale*

XIII. The *allegro moderato* from Schubert's Unfinished Symphony.

Sir DANIEL LYSONS: Ladies and Gentlemen. It is announced on the programme that after the lecture there will be a discussion. If any gentleman or lady therefore would wish to make any remarks we shall be obliged if they will send up their cards. As, however, I do not see anybody coming forward I conclude I may take silence as a general approval. I am sure I can corroborate all that Colonel Shaw-Hillier has said with regard to the influence of music on troops on the march. When I was a youngster I marched a great deal in Ireland. We were generally employed in tithe gathering and illicit still hunting. On those occasions we always took our band with us, and I assure you it made the army most popular. Wherever we halted for the night we had the band to play, and we always had a dance, and I need hardly tell you that very few tithes were collected while the band were playing. The still owners were equally grateful to us; for our martial sound always gave them timely notice and enabled them to get everything which was valuable safely hidden away. It is now my agreeable duty to propose a vote of thanks to Colonel Shaw-Hillier for his excellent lecture, and I must also include his most excellent band, and its capital leader, and I do not think that I shall complete my task unless I equally ask you to thank those gentlemen who have provided the curious old instruments that enabled the band to represent the ancient music as it was rendered when it was first composed.

The resolution was carried by acclamation.

Sir DANIEL LYSONS: I am sure I may present the thanks of the whole meeting to you, Colonel Shaw-Hillier, for your excellent lecture, and for your admirable band.

Thursday, April 7, 1892.

MAJOR-GENERAL SIR HENRY J. ALDERSON, K.C.B. (h.p.), R.A.,
President, Ordnance Committee, in the Chair.

FIELD HOWITZERS AND MORTARS.

By Lieutenant-Colonel N. L. WALFORD (h.p.), R.A.

WHEN I accepted the invitation, which the Council of this Institution did me the honour to give, that I should read a paper on "Field Howitzers and Mortars," I did so with very considerable misgivings, since I felt that I was in truth called upon to prophesy publicly with reference to matters on which there is at present scarcely sufficient information to enable an opinion to be formed.

Only two nations, the Russian and the Swiss, have as yet definitely organized batteries answering to the above description; in other armies the question is still in the experimental stage, while in no case has either the armament or the organization of such batteries undergone the stress of war, which must ever be the ultimate test of excellence and efficiency.

It is evident, therefore, that any criticism of the systems adopted by the two Powers mentioned must be limited in its scope by our want of experience, and that the utmost that can be done is to endeavour to reason from the causes which have led to the introduction of high-angle-fire batteries, and to thus deduce the character of their probable armament, organization, and duties in the field.

I propose, therefore, to speak first of—

The Causes which have led to the Introduction of Howitzer and Mortar Field Batteries.

These causes are two in number; they are—

1. The flat trajectory of modern field guns, which, while it has increased the probability of hitting a vertical target in the open, has rendered it impossible, at medium ranges, to reach troops standing behind cover, either natural or artificial, except on the condition that that cover can be pierced or beaten down.

2. The powerlessness of the shell of modern field guns against such cover as is now used, together with the increasing tendency to make use of cover, not only in the defence but in the attack. This powerlessness is due not, as some imagine, to the inefficiency of modern

field shell (which are indeed far more powerful than of old), but rather to the increased strength of such cover as is used in the field, together, as before mentioned, with the tendency to more frequently make use of such cover.

It may be interesting, while considering this point, to study the probable reasons which have influenced Russia and Switzerland, which differ so widely in all respects, as military Powers, in their political situation, and in their geographical position, in the adoption of this equipment, and have made them the pioneers in Europe of an entirely new departure in field artillery.

These reasons were, however, I believe, founded on one event, namely, the defence of Plevna, by Osman Pasha; but that defence has been regarded by the two peoples from a different point of view. Russia, whose very size renders invasion practically impossible, while her position places her beyond the highways of Europe, has regarded the question of high-angle fire in the field from the side of the attack, whereas Switzerland, having learnt a lesson from the events of 1800 and 1814, proposes to forbid the passage of her narrow valley to the great contending Powers, and thus devotes her entire attention to the means which may assist the defence.

It is scarcely necessary that, while discussing this point, I should go into detail with regard to the Russian attack on Plevna, for which, moreover, the time at our disposal would not suffice; but I may, perhaps, be excused if, in order to substantiate my statement that the Russians have introduced the new weapon for reasons connected with the inefficiency of field guns against earth defences, I mention the following facts, drawn from "La Guerre d'Orient," published in Paris in 1880.

Previous to the third battle of Plevna, the Russians fired during the three days, the 8th, 9th, and 10th of September, upon the Turkish entrenchments with 400 field guns, of the calibre of 3·4 and 4·2 inches, and with twenty siege guns of the calibre of 6 inches; this fire was principally directed on three works, the Kerim-Tabia, the Grivitza redoubt, and the Central redoubt.

The result is thus described:—

"The effect of the projectiles against the infantry lines and the redoubts of the Turks was *nil*; that against the other works of little importance, either as regards the destruction of the parapets or with respect to the losses caused to the defenders. Whenever, in consequence of a concentrated fire, the parapets had been reduced to shapeless masses of earth, they still continued to afford sufficient shelter to allow of their rapid repair, use being made of earth from the ditches and from the interior, and of gabions kept in reserve for this purpose."

The author further states that this failure was due to the fact that the shells of the field guns were not sufficiently powerful, while those of the siege guns did not burst, owing to defective fuzes. It may also be added that projectiles striking at a low angle have a natural tendency to ricochet, while even in cases where the earth is penetrated, the shell tends always to rise to the surface and may thus, unless the

action of the fuze is instantaneous, leave the parapet before it bursts.

Where, however, the slope of descent is steep, both the probability and amount of penetration are increased, and, especially if a delay-action fuze be used, the utmost value of the bursting-charge may be fully utilized.

The Russians were thus led to the introduction of the new form of field artillery by the conviction that, in order to obtain good effect against cover and on troops in rear of it, it was necessary to use a large shell, falling at a high angle. Both of these conditions pointed to the employment of a mortar or howitzer, since a gun which should fire a large shell with a high velocity would be too heavy for field artillery, while it would further fail to provide a steep slope of descent.

The reasoning of the Swiss we may presume to have been different. Asking only to be left in peace, and with no wish for territorial aggrandisement, they desire only to be in a position to refuse the passage through their country to all belligerents; their military system is thus founded on the defensive, since such a passage would be attempted only with a view to gain time, and the certainty of a delay of even only a few weeks, which could be provided by a line of defensive works, if rightly placed, would of itself prevent any attempt being made to force a passage against the will of Switzerland.

In her case, therefore, the field mortar has, we may suppose, been introduced in order to combine, in the defence of a fortified position, the shell power of a siege with the mobility of a field gun, with the object of providing a means by which the stationary guns and howitzers, of which the effect may be neutralized by the unforeseen action of the attacking force, may be supported in their time of need from improvised positions. Moreover, the high trajectory will enable such a piece to search hollow ground, in which the enemy's troops may seek concealment or cover from the low-angle fire of the defence.

In either country the practical object is the same, namely, the destruction of cover and of troops in rear of cover, by means of heavy shell fired from light guns. Howitzers and mortars, when used in the field, have, however, another advantage over guns, of which we may expect that much use will be made. They can themselves, thanks to their high trajectory, fire over cover which is more than sufficient to protect them from the fire of guns, unless the latter are at such a distance that their fire will lose very much in accuracy. For example, a howitzer posted anywhere within 80 yards behind a railway embankment 30 feet high could not be hit by a 12-pr. gun at a range of 2,500 yards, while it could itself fire on the latter.

We may say, therefore, that the introduction of field howitzers and mortars is due to the need which has been felt of the presence with an army of a piece which shall throw a heavy shell (for the destruction of cover) at a high angle (for the evasion of cover), and which shall be sufficiently mobile to admit of its marching with

an army and of its being readily moved from one position another.

We may pass on to—

The Nature and Tactical Use of Field Howitzers and Mortars. 3

The use of field howitzers in war is no new thing; not only had we them in our Service in the past, but we have even now in India batteries provided with such pieces. It is, however, necessary to distinguish carefully between what has been and what is now proposed.

Many of us can remember that, not long ago, in the days of smooth-bore guns, every field battery was composed of four guns and two howitzers, which formed the centre division, or, as it is now called, section. In those days the guns fired only round shot, and the presence of the howitzers was due to the need which was felt for some pieces which could fire shell of a sufficient size, while the extremely moderate length of the range of the howitzers was but a small defect, when the musket was useless at ranges exceeding 150 yards; moreover, the larger bore of the howitzers rendered their case shot more valuable both in attack and defence.

These howitzers disappeared as soon as the invention of rifled guns, throwing an elongated projectile, enabled us to fire effective shell from field guns; it is, however, interesting to note that the muzzle velocity of the Armstrong 9-pr., our first rifled horse artillery gun, was 1,055 f.s., only 120 f.s. more than that of the Swiss mortar, which has an initial velocity of 935 f.s., and throws a shell about 40 lbs. in weight.

The field howitzer of former days was, in fact, a field piece of large bore, throwing a shell heavy in proportion to its own weight, but not so heavy but that the piece and its wagon could move with and at the same pace as the lighter equipment of the guns; its adoption implied the voluntary weakening of the long-range power of the battery (as long range was then understood) with the object of providing greater power at very short, but then decisive, distances, while the mobility of the battery was not affected by the substitution of howitzers for guns, though the number of rounds carried for the latter was of course less than that provided for the former.

There was, however, in those days no idea of carrying into the field shells of the weight of 40 lbs., and still less of 60 lbs., which is the weight of the shell of the Russian mortar, since field entrenchments had not then attained the excessive development which they have now reached, nor was the destruction or demoralization of their garrisons previous to an attack of infantry of the same importance as the days when the assaulting party was out of range of musketry—250 yards, as it is now, when unaimed fire may (at the cost, it is true, of an enormous expenditure of ammunition) be effective at even 3,000 yards.

Thus, the howitzers of those days were, in every sense of the word

field pieces, whereas now, though we speak of field howitzers, we really mean a weapon which, though fairly mobile, and able at any rate to travel on roads, shall throw a shell of the weight and capacity of a siege projectile, and which thus, since the chief factor of mobility is the weight of the projectile, cannot be placed in the same battery or even in the same tactical unit with a truly mobile field gun.

The closest analogy to the proposed form of howitzer is to be found in our Indian heavy field batteries, which are, in fact, not field batteries at all, but a hybrid between field and siege batteries ; but these are still mixed batteries, having four guns and two howitzers. This hybrid organization is a survival, and will probably give way before the opinion which is gradually forming, that shell-power and not gun-power is the most essential quality for the destruction of cover or of troops behind it.

We may say then that the recent introduction of field howitzers is really a new departure, though it has been to some extent foreshadowed, and that its inception is simply a well-marked phase of the constant struggle for supremacy which is always going on between guns and defences, whether the latter be armour-plates or merely earthen parapets. We must own, however, that the increased power of the latter has obliged us, as a type of this last phase, to sacrifice the mobility of the field howitzer to the absolute necessity of using a powerful, and therefore a heavy, projectile. Again, such mobility as is possessed by these pieces is bought at the price of shorter range, since guns to throw shell of the required weight would be incapable of keeping pace with the march of an army, while, moreover, the size and weight of the howitzer shell implies that the number of rounds which can be carried for each piece will be far less than is the case with field gun batteries.

Passing on to consider the tactical use of howitzer and mortar batteries, it will be evident, from what has been already said, that the object of the existence of these batteries is entirely distinct from that of the field gun batteries, and that they will thus be used to supplement and not to replace the latter. The shrapnel shell, the main (and we may hope soon to be the only) projectile of field guns, is most destructive when used against troops in the open, but depends for much of its value on a fairly low trajectory, a fact which, taken in combination with the small bursting charge, which cannot be increased without considerable danger of diminishing the effect, renders it so far useless against troops under cover, that little effect can be produced on them, except at the price of an excessive expenditure of ammunition ; while the common shell, if it be allowed to continue to exist, is, even though much or all of its man-killing power be sacrificed for the purpose of obtaining a large burster, still too weak to be effective in the destruction of cover of any thickness. It is, therefore, to supplement this deficiency of power that the field howitzer is to be introduced ; this piece may, however, fail in the opposite direction, since, owing to its high trajectory, its shrapnel, except at short ranges, may have little value.

We find, then, that each fraction of the field artillery of the future will be weak in the very point in which the other is strong, and each will thus serve to support, but should not be allowed to compete with, the other.

Following out this line of argument, we see at once that for the ordinary purposes of war, for the daily struggle, and even for the main part of the action in battles fought under normal conditions, the field gun will preserve its supremacy, while the use of the howitzer or mortar will be comparatively exceptional, and will be limited to such actions or to such points in a general action as call for the employment of special means of attack or defence. Another reason exists why the use of field howitzers should be limited, namely, the necessity for economy of their ammunition, since the carriage of large supplies of shell, of which two weigh a hundred weight, will sorely try the transport and load up the ammunition columns.

It follows, from what has been already said, that the rule with regard to the forward position of artillery in the order of march will not apply to field howitzer or mortar batteries, since, in the case of accidental meetings with the enemy, they would rarely be required, as the foe would have no time to construct intrenchments, while in the event of a position fully prepared for defence, it may fairly be assumed that timely knowledge of the existence of such a position would permit of their due arrival on the field of battle. If it be admitted that this theory is correct, it will be seen that there is, in this case, no very great disadvantage in the fact that howitzer batteries will be, for the most part, tied to roads, and that they must further, owing to the great weight and size of their shell, be composed of a number of carriages greater than that which constitutes an ordinary field battery, and must thus occupy a greater length of road.

What has been said above applies mainly to the attack; the defence must always obtain great advantage from the presence of batteries which cannot be silenced by the enemy's guns, provided always that their positions are selected with ordinary care and with some regard to the probable contingencies of the action; it must, however, be borne in mind that positions chosen with a view of affording cover to batteries using high-angle fire will not, as a rule, permit of the defence by the batteries of the ground in their immediate front, and that there is thus some danger of howitzers, if retained in their original position, becoming powerless for action at the critical moment.

Considering the time which is at our disposal, it may be well to pass on to —

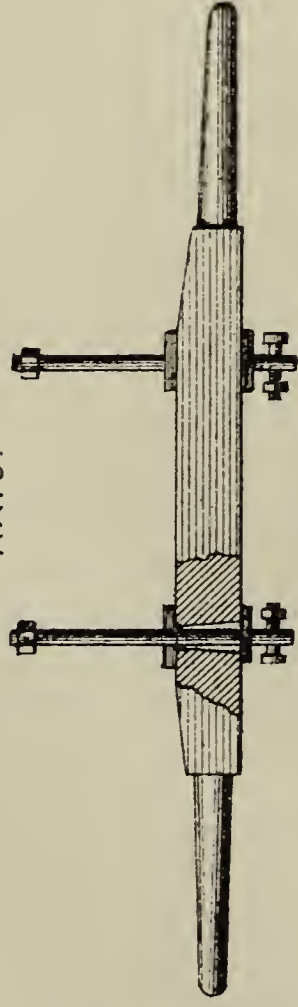
The Armament (including Howitzers, Carriages, and Ammunition) of Field Howitzer or Mortar Batteries.

It will, in the first place, be necessary to discuss the present distinction between a howitzer and a mortar.

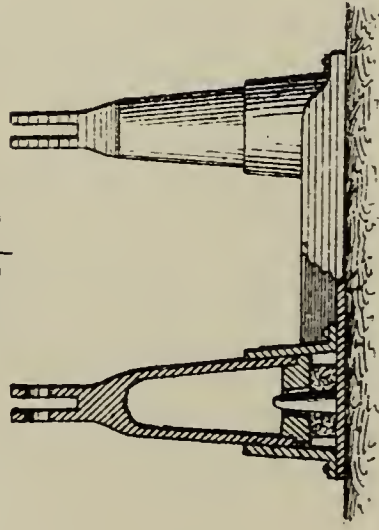
In the old days the difference was very clear; not only were the

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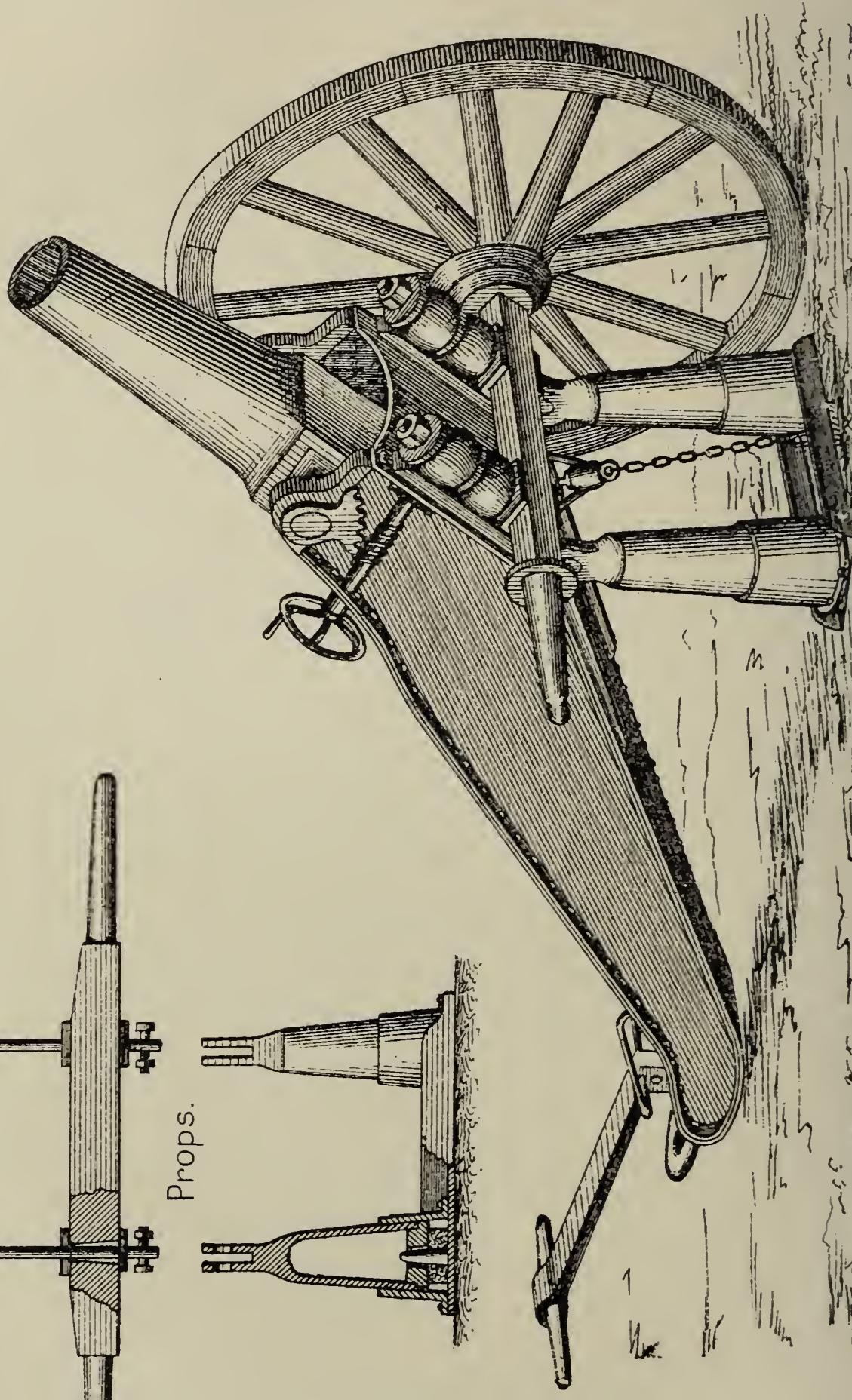
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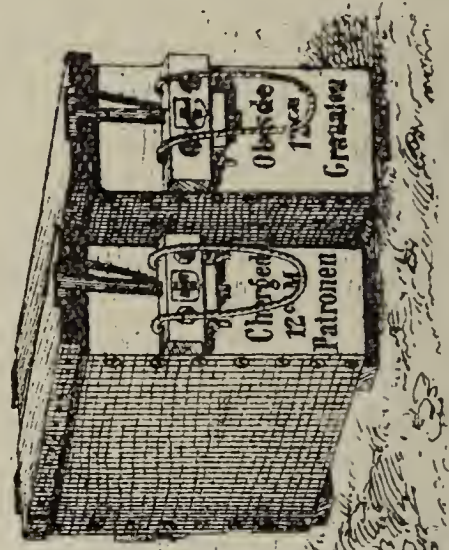
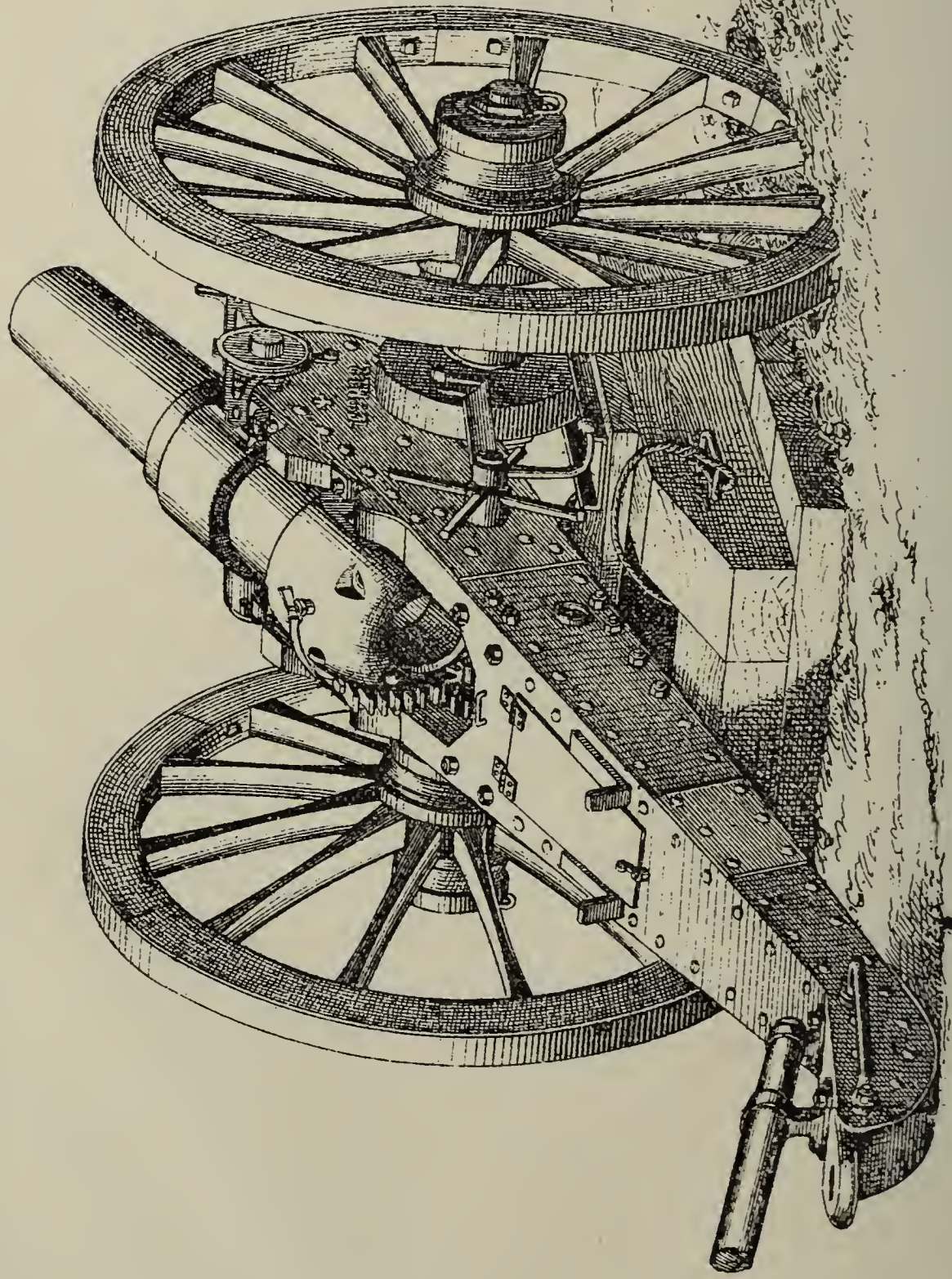
Russia. 6-inch Field-mortar.



(From Schubert's "Feld- und Gebirgs-Artillerien," Vienna, 1890.)

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Switzerland. 4-7-inch Mortar in action.



(From Schubert's "Feld und Gebirgs Artillerien" Vienna, 1890.)

two pieces entirely unlike in appearance, but they differed essentially, owing to the fact that the howitzer, which was, in fact, a weak gun, varied its range, like a gun, by means of a change of elevation, but kept, also like a gun, invariably the same charge; on the other hand, the mortar, while used almost always at one elevation, varied its range by means of a change of charge.

This difference has entirely disappeared; the charge and the elevation are now varied both in the case of the howitzer and of the mortar, while the outward appearance of the two pieces, except in some instances as regards their length, is similar. Speaking generally, we may, however, say that a piece is called a howitzer when it is capable of firing at any elevation up to 35° , while it is called a mortar when its range of elevation extends over that amount.

Since the amount of elevation which can be given to any piece depends entirely upon the mounting, it is obvious that a weapon may thus be a howitzer or a mortar according to how it is mounted; as far as the piece itself is concerned, the distinction, has, indeed, ceased to exist, and all light guns throwing heavy shell at high angles with a low velocity are both howitzers and mortars; the former, when they are on a travelling carriage, giving elevation up to 35° , and the latter, when on a standing mounting, admitting of a higher angle of elevation. If we further take the case where one piece has both descriptions of mountings, all difference disappears. On these grounds I propose to speak of the above description of weapon by only one name, that of howitzer, the French *obusier* or shell gun, a generic term.

With regard to armament of field howitzer batteries as proposed by the principal European Powers, I am sorry to say that I have little to add to the statement which I made in my lecture of last year, to the effect that France, Spain, and Russia preferred a 6-inch calibre, while Austria, Sweden, and Switzerland were inclined to adopt one of 4.7 inches, Germany being doubtful between the two calibres, while the United States have adopted a calibre of 3.6 inches, and a 20-lb. shell. These facts testify to the struggle which is going on in the minds of those responsible for the choice of calibre between shell power and mobility, or between shell power and range.

Of Russia and Switzerland, which alone have accepted a complete equipment, the former has assumed shell power as the more important of the two considerations, while the latter, influenced also partly, no doubt, by economy (since the new howitzer is an old gun bored-up), has chosen gun power, as shown by the longer range. The main differences between the two armaments are shown in the accompanying table.

The time at our disposal will not allow of a detailed description of these armaments, but a few words as to their general character may be desirable.

The Howitzer.—The piece itself will, in all probability, as a rule be constructed of steel, as is the case with the Russian mortar; Austria may, however, offer an exception to this rule, since she still holds to steel-bronze as the material for her field guns; while Switzerland, making use, as has been mentioned, of old guns, has

used both steel and bronze for her new howitzers. We may assume that, whatever the material, the weight of such a howitzer will not exceed 9 or 10 cwt.; this will imply a length not exceeding 9 or 10 calibres.

The Carriage.—The howitzer carriage, as compared with the gun carriage, has to resist a lesser shock, but receives it in a direction tending to exercise a greater strain, which, at high angles of elevation, will be but little relieved by the recoil. It must thus be made exceptionally strong, unless, indeed, other means be taken to assist the axle and wheels against the vertical component of the blow.

In the Russian carriage, the bolts which connect the body with the axle are provided with indiarubber buffers, which, when the howitzer is in action, are inclined at an angle of about 45° to the horizontal; these, by their elasticity, tend to diminish the shock of the discharge upon the axle, which is further supported by two props, also bedded on indiarubber buffers. The plate on which these props rest is held fast to the axle by a chain of which the length can be adjusted, and the whole system thus recoils with the gun. In this manner the shock of the discharge, attenuated by the top buffers, is transferred through the axle and the lower buffers to the ground, the wheels being saved from the blow by making the props of such a height that they are lifted off the ground.

When the Swiss mortar is brought into action, small trenches are dug for the wheels, and the weight of the piece and carriage is allowed to rest on a portable bed, which is inserted between the wheels, and has two grooves on the upper surface; in these grooves run two cast-iron rollers, acting as trucks to carry the weight of the whole system. In this case also the wheels are relieved from the shock of the discharge; but, since the charge is smaller and the shell is lighter than in the Russian equipment, we do not find any buffer arrangement introduced with a view of sparing the axle. The bed is carried on the carriage, and weighs 3 cwt. 1 qr. 20 lbs.

The Charge.—The charges used by the Russians and Swiss are given in the table; they are, of course, small in proportion to the shell, and give comparatively low pressures. The division of the charge by the two nations is worthy of notice, and, in this respect, the Swiss system appears to be the better, since the Russian division into $\frac{1}{2}$ and $\frac{1}{4}$ gives only four charges, viz., $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, and whole, whereas the Swiss, using $\frac{1}{2}$ and $\frac{1}{3}$, have five, viz., $\frac{1}{3}$, $\frac{1}{2}$, $\frac{2}{3}$, $\frac{5}{6}$, and whole charge.

The Projectiles. Common Shell.—The Russians use a common shell, weighing about 60 lbs., with a bursting charge of 10 lbs.; while the Swiss have a ring shell, of 40 lbs., with a bursting charge of 2 lbs. 2 ozs.

In the absence of actual experience it is difficult to decide which of these weights is the better, but it seems probable that the Russian shell is heavier than is necessary, and the Swiss lighter than is desirable.

Every pound added to the weight of a shell beyond what is absolutely necessary to enable it to do its work is a distinct disadvantage,

Since an exaggerated weight brings with it one or more of three consequences, viz. :—

1. Either the number of rounds carried must be small; or
2. The weight behind the team must be large, *i.e.*, the mobility of the battery must be diminished; or
3. The number of wagons with the battery must be increased, and thus the length of the column on the line of march be augmented.

The Russians, in order to avoid the first two disadvantages, have accepted the third; their mortar battery, at war strength, consists of thirty-six carriages, and would occupy about 600 yards of road. The Swiss, on the other hand, have held to six wagons, and thus, though their shell weighs about 40 lbs. to the Russian 60 lbs., their wagon teams have to draw 46 cwt., and their gun-teams an average of 42.5 cwt. to the Russian 38 cwt. and 28 cwt., and they have, nevertheless, only 70 rounds per mortar with the battery, in place of the 92 rounds of the Russians.

The problem is hard to solve, but one thing is certain, that the common shell must at all costs be equal to its work, that is to say, it must be of such a weight as to be capable of perforating any cover (including overhead cover), which is likely to be encountered in the field, and must contain a sufficient bursting charge to destroy it after penetration. On the other hand, every inch of size and every pound of weight added after these conditions have been satisfied is a very serious disadvantage.

Shrapnel Shell.—Each of the equipments before us has a shrapnel shell; the Russian weighs 68 lbs. and contains 683 bullets, while the Swiss, with a weight of 39 lbs., has 475 bullets.

The question as to the probable utility of shrapnel for high-angle fire is being discussed with some warmth on the Continent; on the one hand, it is urged that an effective shrapnel of large size will have an enormous effect on troops, even though they be under cover, if its bullets descend at so great an angle that the cover gives but small protection; on the other hand, it is stated that the observation of high-angle shrapnel fire is so difficult, and the effect of even apparently effective shrapnel so small at a high angle of elevation, that it is more than probable that the garrison of an earthwork would be driven from their defences by common shell in less time and with less ammunition, even if with less loss, than would be the case if shrapnel were used. Moreover, it is pointed out that shrapnel is almost useless against overhead cover.

The quarrel is a very pretty one, as it stands, and it may be sufficient to say here that, since these weapons will undoubtedly be sometimes called upon to fire at low angles on troops in the open, we cannot afford to dispense entirely with shrapnel, while the choice of his projectile may be safely (and best) left to the Officer who commands the battery in action.

It will be observed that neither of the equipments before us includes a case shot; this appears to point out that these batteries will not be expected to defend their immediate front; and, moreover, seems to imply that they will fire principally at long ranges beyond the reach

of the enemy's cavalry, unless, indeed, it be intended that they shall always be attended by a special escort. Such limitations appear to be undesirable, and I venture to think that the omission of this projectile is an error.

Other details.—Having decided on the weight and the capacity of the shell, it is next necessary to consider what should be the extreme range of the howitzer; this will govern the muzzle velocity, and, therefore, the charge, and therefore, again, the weight of the howitzer, while the amount of recoil and the necessary strength and weight of the carriage must not be left out of account.

Comparing the equipments now before us, you will see that the Russians, accepting a lower extreme range than the Swiss, have a lower muzzle velocity; thanks to this decision, their mortar, though firing a heavier shell, is lighter than the other, while, their carriage being only 84 lbs. heavier, their total weight behind the team is 3 cwt. less than is that of the lighter of the Swiss equipments.

We thus see that, when considering the details of this or any other field equipment, three main points have to be decided; these are—

1. What is the least size, capacity, and consequent weight of a shell capable of doing the desired work.

2. What is to be the extreme effective range. This decision governs the muzzle velocity, and thus the charge; from the latter, again, we must deduce the weight of the mortar, and indirectly the weight of the carriage, as being dependent upon the amount of shock on discharge and the force of recoil.

3. What is the greatest weight behind the team which will not injuriously affect the mobility of the piece, taking into account the circumstances under which it will be used in war; this condition acts in opposition to the two former, and generally leads to important modifications, resulting in such a compromise as forbids perfection in any one point.

It is not my purpose to say to-day anything with regard to our projected equipment, since the time has not yet come to make public what is being done; but I am desirous to bring before you the considerations on which the designing of an equipment must be based, in order to show that this is no simple matter, nor one which can be decided in a moment.

The Equipment and Organization of Field Howitzer Batteries.

The equipment of a Russian field mortar battery consists of 6 mortars, 18 ammunition wagons, 6 carts (to bring up the ammunition to the guns), 1 spare carriage, and 5 store wagons.

You will notice at once the large proportion of ammunition wagons to mortars, large even for the Russian Army, in which field and horse artillery batteries have 12 ammunition wagons. This proportion shows the immense importance attributed by the nation which has last been engaged in war on a large scale to a sufficient supply of ammunition.

On reference to the table you will see that 92 rounds per mortar

are carried with the battery; of these 12 are carried in each limber, 4 in each wagon, and 8 in each cart.

The distribution of the weight behind the team is thus as follows:—

Mortar, Carriage, and Limber.

	cwt.	qrs.	lbs.
Mortar	9	0	6
Carriage.....	12	2	6
Limber	8	2	22
Ammunition	7	1	20
Stores	0	2	17
	—	—	—
Total	38	1	15

Wagon and Limber.

	cwt.	qrs.	lbs.
Limber and wagon-body	12	0	0
Ammunition	14	3	12
Stores.....	1	2	3
	—	—	—
Total . . . ,	28	1	15

You will observe here, first, that the total weight, as given in the table, does not include any men carried on the limber or wagon; if three numbers be mounted on the limber and six on the wagon, the weight will be brought up to—

	cwt.	qrs.	lbs.
Mortar and limber (with six horses)..	42	3	15
Wagon (with four horses)	37	1	15

I have brought these figures to your notice for two reasons:—

1. I want to point out that the weight behind the teams must be enormously increased, if any large proportion of the detachments be carried on the carriages, while, since these batteries will seldom move faster than a trot, and then only for a short distance, it will rarely be necessary to mount the men on the limbers and wagons.

2. I will ask you to notice the very small weight of stores carried; it is so small that we may suppose that none of the personal equipment of the men is on the carriages. All this, as well as every item of stores which can possibly be dispensed with, is apparently conveyed by the store wagons, which do not form part of the fighting battery.

To the best of my belief this arrangement holds with all batteries on the Continent; the French are especially notable in this respect, since their horse artillery carry only a few pounds of stores with the gun (though it must be acknowledged that their wagon is excessively heavy). Surely this should be the rule with all field artillery, who should carry nothing with them but what they actually need daily in

the field, and not overload themselves with all and everything that they may require at some time or another. It may be remembered also that the personal equipment is piled not only on the carriages but also on the draught horses, with the result that a near horse carries a load, in addition to the weight he is expected to draw, of about 18 stone; can we wonder, then, that horse artillery find it difficult to compete with cavalry, who are not handicapped by any weight behind them, and do not suffer from the checks and strains inseparable from rapid movement over rough ground? But, perhaps, I am wandering a little from the subject of my present paper.

To return, I will ask you to consider the supply of ammunition in a Russian mortar battery, viz., 92 rounds per mortar.

We shall not, of course, expect the same rate of fire from a howitzer as from a gun battery, namely, 3 rounds per minute, but we may fairly ask for 1 round per minute as the ordinary rate of fire. On this point I find it stated that the Russians fired 50 rounds in 45 minutes from a battery of 6 mortars.

Assuming that 1 round per minute will be a fair average, the Russian battery carries sufficient rounds to keep up its fire for 552 minutes, that is, for 9 hours, without drawing on the ammunition column, or, as they call it, the "flying park," which carries additional ammunition sufficient for a further fire of $9\frac{1}{2}$ hours. That is to say, the Russian mortar batteries could fight a general action on two consecutive days, using only so much ammunition as would be carried with the field army.

The Swiss batteries, with the ammunition carried on the carriages of the battery, could fight for more than seven hours, or, including that with the ammunition column, for two days of ten hours each.

But in order to have this supply of ammunition, one nation (the Russians) has 24 carts and wagons with the battery, while the other (the Swiss), though using only a 40-lb. shell, has a weight behind the wagon team of more than 46 cwt.

It is evident that we are here again approaching a very knotty question, which divides itself into two parts, viz.:—

1. What is the smallest amount of ammunition which a howitzer battery *must* carry?

2. Assuming that the wagons should be as mobile as the guns, what is the least number of wagons which can carry this amount of ammunition? This last point is, you will observe, again dependent upon the weight of the shell, assuming even that it is not complicated by a demand that the wagons shall carry some of the detachment.

With regard to the personnel and horses, the Russian battery appears to be organized in a similar manner to the other field batteries; it consists of 5 Officers and 226 men, with 167 horses.

The latter are probably (judging by the heavy field batteries which have approximately the same establishment) divided as follows:—

Riding Horses.

Officers' horses	5
Non-commissioned officers' horses ..	18

Draught Horses.

6 mortars	36
18 wagons	72
6 carts	6
1 spare carriage	4
2 store wagons	8
3 store wagons	6
Spare horses	12
	—
	144
	—
	167

This branch of the Russian artillery is organized in four regiments, each of four batteries and a flying mortar park; a fifth regiment is shortly to be added. On mobilization, the flying mortar park is expended into a mortar park brigade of 4 parks, in addition to which each regiment has a mobile and a local mortar park. The Swiss organization is by batteries of 6 mortars, which are brigaded with gun batteries to form units of position artillery.

The Place of Field Howitzer Batteries in Army Organization.

The unit of position artillery in the Swiss army is the brigade division, which consists of 12 4·7-inch guns, 12 4·7-inch mortars, and 8 3·14-inch guns.

There are 5 of these brigade divisions, giving a total of 60 mortars, to which may be added 10 spare. The brigade divisions are entirely independent of the present divisional and of the suggested army corps organization of the Army, and can be attached provisionally to any force which may require them. It is probable that they will be told off to assist in the defence of certain specified (and in some cases already prepared) positions, and will be used by the Commander-in-Chief of the Army as circumstances may dictate, constituting thus a distinct force outside of the establishment of field or mountain artillery.

With regard to the Russian mortar batteries, nothing appears to be laid down as to their distribution among the corps of the field army, and it thus seems to be more than probable that they also will be retained, as independent units, at the disposal of the supreme military Commander, to be combined by him in accordance with the need for them, and to be attached, in case they are required, to any corps which may be engaged in operations calling for their assistance.

We have as yet no certain knowledge of the German organization of this description of field artillery, but various signs tend to point out that howitzers will be used, in brigade divisions of three or four batteries, as army artillery, contra-distinguished from corps or divi-

Details of Field Mortar Equipments.

	Russia.		Switzerland.	
Mortar—				
Length	4 feet 6 inches.		4 feet 11 inches.	
Material	Steel.		Steel and bronze.	
Weight	9 cwt. 0 qr. 6 lbs.		Steel, 10 cwt. 2 qrs.; bronze, 12 cwt. 1 qr. 19 lbs.	
Carriage—				
Weight, unpacked.....	12 cwt. 2 qrs. 6 lbs.		11 cwt. 3 qrs. 6 lbs.	
Weight, packed	22 cwt. 2 qrs.		29 cwt.	
Limber—				
Weight, unpacked.....	8 cwt. 2 qrs. 22 lbs.		7 cwt. 0 qrs. 20 lbs.	
Weight, packed	15 cwt. 3 qrs. (12 rounds).		14 cwt. 1 qr. 24 lbs. (10 rounds).	
Wagon—				
Weight, unpacked.....	12 cwt.		15 cwt. 2 qrs. 7 lbs.	
Weight, packed.....	26 cwt. 1 qr. (24 rounds).		45 cwt. 2 qrs. (60 rounds).	
Weight behind team—				
Mortar	38 cwt. 1 qr. 15 lbs.		Steel, 41 cwt. 2 qrs. 8 lbs.; Bronze, 43 cwt. 1 qr. 26 lbs.	
Wagon	28 cwt. 1 qr. 15 lbs.		46 cwt. 1 qr. 27 lbs.	
Ammunition—				
Weight.....	Common shell, 59 lbs.		Ring, 39 lbs. 10 ozs.	
Bursting charge.....	10 lbs.		2 lbs. 2 ozs.	
Fuze	Percussion.		Percussion.	
Shrapnel—				
Weight.....	68 lbs. 9 ozs.		39 lbs. 10 ozs.	
Number of bullets.....	683		475.	
Bursting charge.....	8·7 ozs.		5·6 ozs.	
Fuze	Time and percussion, 28 seconds.		Time and percussion.	
Full charge.....	3 lbs. 13 ozs.		2 lbs.	
Divided into.....	$\frac{1}{2}$ and $\frac{1}{4}$.		$\frac{1}{2}$ and $\frac{1}{3}$.	
Muzzle velocity.....	748 f.s.		935 f.s.	
Extreme range.....	3,500 yards.		5,000 yards.	
Rounds carried per mortar—				
With battery	92	(552).	70	(420).
With ammunition column.	96	(576).	130	(780).
In park	24	(144).	100	(600).
Total	212	(1,272)	300	(1,800)

sional troops. It is a matter of common knowledge that the German Army will in the next war be, in all probability, organized in larger units than army corps; these will, it is understood, be designated "armies," and will consist, in round numbers, of 100,000 men each

It is believed that one or more brigade divisions of field howitzer batteries will be attributed to each of these armies, and will be considered as a force at the disposition of the Commander of the Army alone.

We may thus conclude that the new field howitzer batteries are, practically, the lineal descendants of the old batteries of position, but differ from them in the substitution of a light howitzer for a heavy gun, and in the increase (in the case of Russia) of the number of ammunition wagons. By these two changes they are made more mobile, and are thus rendered capable of keeping pace with the movements of a field army, and of taking part in the attack, whereas, if I am not mistaken, the functions of position artillery were (as its name implies) limited strictly to the defensive. They form thus an addition to, and still remain outside of, the organization of the corps and divisional artillery, being a special force available for special duties, and, as it were, a sledge-hammer in the hand of the Commander of an army, to be used by him when, in his judgment, a heavy blow is either necessary or desirable.

Appendix.

Practice with the Russian field mortar, extracted from the "Jahrbücher für die Deutsche Armee und Marine" for December, 1891.

1. In comparison with the heavy field gun, which throws a 28-lb. shell :
Target.—Shelter-trenches, occupied by standing and kneeling dummies.

Range.—2,130 yards.

Projectiles.—Field gun, 24 common shell and 100 shrapnel.

Field mortar, 12 common shell and 50 shrapnel.

Hits.—Field gun, 37 out of 96 dummies, or 39 per cent. 176 hits.

Field mortar, 46 out of 88 dummies, or 52 per cent. 199 hits.

Time.—Field gun, 1 hour 15 minutes.

Field mortar, 1 hour 6 minutes.

The trenches were on the reverse slope of the hill, and could not be seen from the batteries.

2. Practice with shrapnel against a field work :

Target.—A field work, 115 yards wide and 27 yards deep on the capital. Parapet, 4.6 feet high, and 13 feet thick. The work contained trenches, traverses, and blindages, and was occupied by 366 sitting dummies.

Range.—2,350 yards.

Projectiles.—12 shrapnel with percussion, and 50 with time fuzes.

Hits.—98 dummies were hit, or 26 per cent., by 322 bullets and 14 splinters.

Time.—1 hour.

3. Practice with half charges :

Target.—The same.

Range.—1,640 yards

Projectiles.—50 shrapnel with time fuzes.

Hits.—100 dummies, or 27 per cent., were hit by 201 bullets.

4. Practice with common shell, with half charges :

Target.—The same.

Range.—1,970 yards.

Projectiles.—100 common shell, with percussion fuzes.

Results.—56 craters, within limits bounded by two lines, one 33 yards in front of the glacis, and the other 22 yards in rear of the gorge ditch. 19 hits on the redoubt.

Time.—1½ hours.

5. Practice against a wire entanglement :

Target.—A wire entanglement, 59 feet long and 26 feet broad, covered by a glacis 5 feet high.

Range.—1,100 yards.

Projectiles.—50 common shell, with full charge.

Hits.—9 craters in front of the obstacle, 5 in it, and 13 in rear. 8 pickets were destroyed, but the entanglement was as efficient after the practice as it was before.

Time.—45 minutes.

The craters of the common shell had diameters of from 5.74 to 9.84 feet, and a depth of from 2.95 feet to 4 feet.

It was concluded from the practice that at least 5 feet of earth would be necessary for all overhead cover.

Lieut.-Gen. W. H. GOODENOUGH, C.B., R.A. : By way of opening the discussion, I would express my opinion that as an earnest of attention being drawn to this subject, and of the possible introduction of, perhaps, a reserve of field artillery in the shape of field howitzers and mortars, we may welcome this lecture in a particular manner. I have for many years thought that we should do right in having a reserve of that kind. The necessity for it, I think, is apparent, whether in India or in countries nearer home, and whether from the examination of our own experience in wars, or from the example of foreign armies. I had not intended to make any remarks by way of criticism, but only wished to welcome the subject and welcome the lecture as an earnest of what may follow.

Major E. S. MAY, R.A. : With reference to what we have heard, I think the experience of all campaigns where intrenchments have been made use of has shown the value of vertical fire. Even before the days of Plevna the value of vertical fire had been recognized. I will read an extract I have taken from an article that appeared in 1885 in the Journal of the Military Service Institute of the United States, by Lieutenant Birkhimmer, in which he refers to the experience at the latter end of the American War, where vertical fire had been used. He says : "Our experience in the campaigns of 1864 and 1865 against Lee's army, securely intrenched in a chosen position, well illustrates the effective use that can be made of vertical fire. There were at first a few Coehorn mortars with the General Artillery reserve, which were gradually brought to bear against the enemy thus protected by fieldworks of strong profile. As the campaign progressed the utility of this fire, and the ease with which mortars could be transported from place to place, came more to be appreciated, until Coehorn mortars were everywhere in great demand." Then he goes on to say the Germans had solved the problem by adopting Krupp's 15 c.m. (5.9") rifle-steel mortar. I think I am right in saying that since that time they have introduced a lighter mortar. The Krupp mortar weighed 792 lbs., and fired a shell weighing 70 lbs., with a bursting charge of 4 lbs. 10 ozs., and a range of 3,775 yards, and I think was better adapted to a siege than for use in the field. At Plevna the noticeable point was the absolute indifference with which the Turks came to regard the Russian fire ; they quietly waited under cover

While the bombardment was going on, and, when it ceased, coolly went out, met the columns of assault with a heavy musketry fire, and drove them back. Lieutenant Arkhimner, from the experience of the American Civil War, comes to just the conclusion Colonel Walford has done, namely, that a sufficient reserve of field howitzers held in the hands of the Commander of the whole forces for use as occasion might demand, would be of great use. I dare say many present will remember the way in which the German General Von Sauer has lately written about vertical fire: he is a very strong believer in it, and he goes so far as to wish to see every brigade of infantry accompanied by a battery of howitzers. Indeed, he said howitzers would probably be able to successfully engage ordinary field guns in the preliminary artillery duel. His opponents, while they combated such extreme opinions, all seem to have admitted the necessity for howitzers and vertical fire in the future, and they all agree that the best way would be to have a reserve of mortars or howitzers for use when occasion arose, in the manner foreshadowed by the lecturer. As regards shrapnel I can see there is a good deal of difficulty connected with its use, but I trust we may hope it will be overcome in due time. No doubt heavy shells falling at a very steep angle would make such deep craters that their splinters would mostly fly up in the air, and not do much damage, in a man-killing direction, whatever advantage they might be against earthworks.

Colonel W. R. BARLOW, R.A.: I should like just to ask one question. I do not see anything in those tables as to the weight of bullets which the Russians employ. It is rather an important thing. Is the weight known of the bullets?

Colonel WALFORD: I could not say from memory, but I could find it out.

Colonel BARLOW: I have no doubt whatever in future wars, shrapnel fire from howitzers will be the most effectual at moderate ranges that you can get. At a high angle of descent it is the only shell which will search out cover. Cover must be taken more every day under the tremendous infantry fire, and a velocity of, say, 1,800 f.s. from field guns for shrapnel seems to me to be of very doubtful value. I believe, by reducing the velocity very much you will reduce not only the strain on your gun and carriage, but you will also reduce the very heavy work which you have thrown on your gunners, as you reduce the effect of recoil. Even looking at that very heavy Russian howitzer, 38 cwt., behind the team, I do not see why it should not be taken over heavy ground. I have seen the old-fashioned guns at Aldershot taken over very heavy ground, and over ditches, so that I cannot see why we should limit the use of howitzers to roads. I think it would be crippling their use very much if we did. There is another point as to howitzers. Colonel Walford has given an instance where field guns were of no effect whatever against fieldworks, though howitzers were effective. Now it seems to me that if other nations are going in for howitzers which are thoroughly effective against field works, it would be a very serious condition indeed if we have not got howitzers which will meet them. I believe in having a small charge in your howitzer, and having a very large charge in the shrapnel shell; you will then always have sufficient terminal velocity, as you do not want more than 500 feet velocity to kill a man. If for the sake of gaining accuracy you dispense with a heavy charge in the shrapnel shell, you will fall into error; your bullets will not have sufficient penetration to injure men. I think that a shrapnel shell should have a heavy charge, and that of itself alone will give nearly 200 feet per second to the bullets in the shrapnel shell, thus bringing the striking velocity up to 400 or 500 feet. Personally I am deeply obliged to the lecturer who has brought this most important subject to our notice. I think that the solution of arming our horse artillery will also be found by using guns approximating to a howitzer. The lecturer pointed out that there is very little difference between the mortar and the howitzer. I go a step further, and say there is very little difference between the howitzer and the guns. I believe the howitzer with a very moderate velocity, 1,000 or 1,200 feet a second, would be most effective for shrapnel shell.

Colonel WALFORD (in reply): I have not very much to answer. There is, however, one thing that I should like to point out. As far as my experience goes at present, there is one very considerable disadvantage in the use of high-angle shrapnel, and that is, that at practice it is exceedingly difficult to judge from the

firing point the distance of burst. The rule for field guns, which, of course, comparatively simple, since in that case the height of burst is not very great, and any errors which may be made will probably be inconsiderable, is of very little use when applied to high-angle fire. Since the shell may fall at an angle of something like 40 degrees, it is extremely difficult, looking from the firing point, to judge the distance of burst, while I do not myself feel certain (not having as yet arrived at a state of knowledge which would enable me to say) at what distance from the target such a shell ought to burst. In the course of some practice during last year, we obtained some very satisfactory results with shell which burst something like 200 yards short, and 120 feet above the ground. Of course, when you have to deal with distances and intervals like these, it will be almost impossible to estimate from the firing point the exact position of burst. Another difficulty in high-angle shrapnel practice will be to judge the "line" of the shell. If a shell bursts 120 feet up in the air, it must be very hard to decide whether it explodes in line with a small target. Supposing that you are firing at a fieldwork three times the length of this theatre, it would be very difficult, at a range of 2,000 or 3,000 yards, to know whether your bullets were falling into it or not. In the present state of our knowledge, it is almost impossible to be certain on this point; there is, however, no reason why we should not eventually work up to some degree of certainty, and I hope that we shall try to do so, and to get some good effect out of high-angle shrapnel. But I believe that, as has been already said, we should in practice get more real advantage out of common shell than from high-angle shrapnel. There is, again, one great objection to increasing the bursting charge of shrapnel beyond certain limits, and I am, moreover, afraid that I, personally, rather doubt whether we should ever get an increase of velocity of the bullets of 200 feet per second by means of the bursting charge of a shrapnel shell. We have found in practice that an increase of the bursting charge beyond what the walls of the shell will stand has the following result, viz., that instead of, as it were, simply vomiting forth its bullets, the shell itself opens and becomes a species of inferior common shell, covering a very large space of ground with a number of widely dispersed fragments. I am inclined to think that Continental nations will take the bull by the horns, and decide that, instead of using shrapnel, which is difficult to observe, and the effect of which is doubtful, they will employ common shell filled with some high explosive. The advantage of such a bursting charge is, that whereas the ordinary common shell filled with powder, falling at a high angle, may very possibly, and does frequently, bury itself in the ground before bursting, the splinters being consequently thrown straight up into the air (in which case they hurt nobody), the high explosive shell will probably burst before it has penetrated much below the surface of the ground, and the explosion may, therefore, do very much local damage. High explosives break up the shell into exceedingly small pieces, so that, probably, a shell so filled would, if you could arrange for the burst to take place at the right moment, be extremely destructive. There is no other point, I believe, to which I have to reply.

The CHAIRMAN (Sir H. J. Alderson) : We have had a most instructive lecture from Colonel Walford, on the subject of field howitzers and mortars. It is a subject to which my colleagues on the Committee are giving their very closest attention at the present moment: but it is one which, in working out, requires a great deal of experiment and practice. On the Continent, nobody except these two, the Russian and Swiss, is yet agreed as to what is the best form to use. I think the great question of high explosives has complicated the matter; but I do not believe any nation yet really has determined to carry them into the field. Nearly every day we hear of accidents occurring with high explosives. We ourselves have been very free so far, and we hope we have got something that will answer; but at present it is premature to say anything definite about it. No doubt if we can take high explosives into the field, and use them with these mortars or howitzers, it will be of immense importance to us. I am sure you will authorize me to offer our warmest thanks to Colonel Walford for the great pains and labour he has been at in preparing his lecture, which has given us a large amount of most instructive information, and will be of the greatest possible use to those of us who are engaged in working out this question for our own Service.

Friday, April 8, 1892.

ADMIRAL OF THE FLEET SIR GEOFFREY T. PHIPPS HORNBY,
G.C.B., First and Principal Aide-de-Camp to the Queen, Vice-
Patron of the Institution, in the Chair.

THE ROYAL NAVAL EXHIBITION, 1891.

By Captain Sir ALFRED JEPHSON, R.N., Honorary Secretary.

WHEN asked to read a paper on the Royal Naval Exhibition I confess I agreed with a Service journal that it was an old story, yet I think that a slight retrospect of what has been admittedly a most successful and interesting affair may not be a waste of time, especially if we can draw from it some conclusions which may be useful hereafter. *Ab actu, ad posse valet illatio*—from events which have taken place we may form deductions as to those which are to ensue.

I do not think it of the slightest importance to this paper to try and trace out who first suggested the Exhibition; but H.R.H. the President stated in a speech of his that to him it was first suggested by H.R.H. the Duke of Edinburgh, and the fact of His Royal Highness having graciously consented to become our President was a matter of the greatest moment for us, for it was *per se* the first move towards success. At the outset, therefore, it is only becoming that we should acknowledge fully the great assistance we have derived from our President, who took so keen an interest in the Exhibition. Thoroughly posted in our financial and other affairs from week to week, expressing his willingness to attend meetings, and doing so when requested, and always ready to give us the advantage of his great knowledge and experience to pull us out of a difficulty or guide us when in doubt, it would be impossible for us to forget our indebtedness to His Royal Highness from the opening to the closing day, when he, as the last visitor left, addressed a few parting words to the sailors.

It was by no means clear at first of what the Exhibition would consist, and the future was perforce left in a great measure to shape itself, but—

“There’s a divinity that shapes our ends,
Rough hew them how we will”—

and in our case we have no cause to regret the shape the Exhibition eventually assumed.

It is difficult to see how any other course could have been adopted,

for it depended to a great extent on what could be loaned or otherwise got together, supplemented by whatever a liberal and judicious outlay of money could command.

Although two years' preparation and 50 acres of ground, together with a sheet of water, would, in my opinion, have been the basis of a scheme worthy the importance of the Service, it could never be seriously contemplated, as it was considered advisable to open in the year following the Royal Military Exhibition.

There is no doubt that some few naval Officers looked on the idea with little sympathy, and for reasons which we can well understand.

It required a certainty of success, and the removal of the doubts as to whether it would be for the ultimate improvement of the men or the increased popularity of the Service.

The scheme, however, once set on foot, they joined heartily in making it go. Others, who believed it could not succeed, wrote and said how glad they were to acknowledge that they were mistaken; and, if I am correct in the identity of Captain Bowser, I had a congratulatory message even from him, of whom I may say, "Those who came to scoff remained to pray."

It is worthy of notice that, by good luck, the right set of men for each section of the Exhibition seemed not only to be available, but willing to give their services; and, looking back, it is difficult to see how the objects of the Exhibition could have been better accomplished by men other than those who gave their time to it so unstintingly.

With regard to the site there was little to choose from: Greenwich was by almost common consent vetoed on account of its distance from town, and no doubt hundreds dropped in to the Exhibition of an evening who would never (considering the weather) have journeyed down there.

Battersea Park was prospected, but never "caught on" as a site. The small distance across the river was a barrier, and in people's imagination would have put the place farther off than it really is.

An extra sixpence cab-fare has a wonderful effect in making people's minds up, for, though on pleasure bent, they have in these cases a frugal mind.

Chelsea being decided on, and having to deal with three separate bodies for the acquisition of the property, some time was spent before the necessary arrangements were concluded; the greatest difficulty being the agreement between ourselves and the Royal Military Exhibition, which entailed on us the necessity of a leap in the dark by taking over their obligations to the Commissioners of Chelsea Hospital.

It is not necessary to go into details, but, after some negotiation, an arrangement was come to with the Royal Military Exhibition authorities for about two-thirds of their original demand.

It was a good thing for us to have settled it, and not a bad one for the Military Exhibition Committee, as anyone can see by their financial statement. Major Malet, in his paper read at this Institution, says, "It was natural for the sailors to take advantage of the opportunity for an Exhibition *given* them by the soldiers."

I do not object to his way of putting it, but he did not go quite far enough, for he forgot to add—given for the consideration of 2,750*l.* paid, and at least another 1,000*l.* liability guaranteed, and since paid by us, for putting Gordon House grounds to rights. It should be in fairness added that these sums included the belongings which they would have sold by auction, and which they valued at about 500*l.*, but which, with additional property of our own, only just reached that sum.

The total number serving on Committees was 160, and some doubt might have been felt as to the harmonious working of so large a number; but the natural and easy way into which the business settled itself was, no doubt, in a great measure owing to the habits of organization which naval Officers have instilled into them at an early age. This fact did not escape the notice of H.R.H. the President, who graciously alluded to it on more than one occasion.

Few hard and fast rules were made, the Chairmen of Committees being left pretty well to their own methods of doing business; but they all worked on the same lines, and, as a broad rule, the method of official business at the Admiralty was followed. Each Committee had its own day for meeting, one day being always reserved for the Finance, which was at once followed by the Executive; so that questions involving expenditure were first brought before the Finance Committee, explanations (when necessary) given, the vote passed and sent on at once to the Executive Committee for confirmation; thus business was accelerated.

In the same way all bills were relegated to the various Committees concerned, checked by them, or the Architect, Manager, or Electrical Engineer, &c., approved by the Honorary Secretary, and laid before the Finance Committee. The members of the Finance Committee were *ex officio* members of the Executive; so also were the Chairmen of Committees. The advantage of this rule was that by attending the Executive meeting their knowledge of what was going on was not confined to their own section of gunnery, navigation, and what not, but they were in touch with the general progress of the Exhibition right through. Most Sub-Committees were again divided into many sections, their names indicating the special work they had in hand. It might be thought that so many small Committees would prove too cumbersome a machinery; but each of these sections, having only one subject to deal with, was able to concentrate all its attention to it, and so perfect its particular branch quicker than if three or four subjects were demanding its attention.

It would be unjust to them, and not in accord with the feeling of all the naval Officers connected with the Exhibition, if I did not here give expression to the sense of obligation that they are under to the various gentlemen not belonging to the Service who worked on the different Committees with them so harmoniously.

I allude not only to the Honorary Officers of the Exhibition—such as the Honorary Solicitors, Auditor, Accountant, Surveyor, and Medical Officers—but to many other gentlemen who have rendered special services connected with finance, electric lighting, the Art Gallery, and the several other sections of the Exhibition, the import-

ance of whose work it would be impossible to over-estimate, and of whose abilities and business knowledge we have reaped the full advantage.

I have not gone fully into the details of the organization and the working of the various Committees. Had I time to do so, their services would be better known. The amount of time, thought, and responsibility devoted to such parts as the acceptance or rejection of exhibits (in itself an onerous duty); the selection of what was best suited to illustrate the various conditions of the Service; the classification of the exhibits of the different sections; the compilation of the catalogue with the various prefaces; the anxiety to have in the Art Galleries only what were well authenticated pictures and relics; the increasing of the accommodation for the large number of visitors; the constant anxiety lest fire should break out and destroy what could never again be replaced—these are a few only of the duties which were cheerfully accepted by the various Committees. The financial arrangements alone occupied the constant attention of one small Committee, whose work has been so satisfactory; whilst the difficulty of getting contracts drawn up so as to meet the views of both sides was so exasperating as to imbue me with a fellow feeling for the ship's cook who, after a lively morning's visit of inspection by the Commander (now a distinguished Admiral), aired his theology and feelings at the same time by remarking that, if there was as much humbugging about in the next world as there is in this, he hoped he should go to the next one after that.

The two heaviest outlays were for the model of H.M.S. "Victory" and the water-basin. These were much debated; the latter so much and so often, that the Chairman of the Works Committee brought matters to a head by saying that it would be far better to come to a wrong decision than not to come to a decision at all.

I think it was a wise dictum, for had it been decided wrongly—to have had no water-basin, we should at once have covered the site with more buildings for exhibits; whereas, if we had delayed much longer, there would have been nothing but a piece of grass there. The fact is we hesitated at first to spend these large sums, because we had to consider the guarantors; but the bold policy was successful, and from the innate love of Englishmen for anything in the shape of water, even a boat with two or three people crossing the lake was enough to draw a small crowd.

The general wish of all connected with the Exhibition was that the public should be able to see what went to make up the fighting power of the Naval Service; hence the desire for the water, in the hope of being able to show a torpedo running, a miniature engagement—anything that could familiarize the people with life afloat.

In furtherance of this idea, it was particularly suggested by H.R.H. the President that people living far away from our naval ports should see a representation of the fighting deck of a modern ship; and this suggestion was carried out by one of the large shipbuilding firms.

The drills and sham fights carried out in the arena by the sailors and marines were a never-failing source of interest, and drew large

crowds. Doubts were expressed as to the reality of the field-pieces, one person asserting they were of wood *tinned over*; another very acute person saying *they were made to take quickly to pieces*, an incontrovertible fact. The running of the Whitehead torpedo and the action on the lake, and, indeed, the whole programme, from the electrically controlled boats to the diver, and the life-saving apparatus, were also keenly appreciated.

Except the "Victory," the chief points of interest where people collected (and excluding the bars) were round the Nelson relics, the lecture on the torpedo in the Camperdown Gallery, the 110-ton gun, and Clayden's models of ocean currents; also the chart engraver, who, as his head was bent low over his work, was often asked by sympathetic ladies if he was unwell.

I have purposely not alluded to the streams of people in the Art Galleries, as everything connected with that part will be dealt with by Major Edye, who is so much better qualified for the purpose than I am. I will merely state in connection with the pictures and relics that a German Admiral, sent, I believe, specially to report on the Exhibition, summed up the Art Section in the following flattering words: "In those galleries they have the history of the British Navy from the earliest period. That history is an almost complete series of triumphs, and no other nation in the world can show such a thing."

The chief characteristics of the crowds were their good nature and sobriety, and their pleasure in rational enjoyment when the opportunity and place is given to them. No malicious damage of any sort was done, and only one or two trifling articles were abstracted. Of course I do not include the light-fingered gentry, who were busy in the "Victory's" cock-pit while people were affected by the Death of Nelson Group.

As I noted the keen interest of the public in the relics exhibited, my thoughts reverted to the cramped state of this Institution, and the inability of the public to see the models, relics, &c., contained in it. If the day comes when these will be exhibited and properly classified, who knows but the owners of some of the precious relics and trophies of the Naval Exhibition may add to the value of the Institution by entrusting it with the keeping of many of these interesting reminders of a by-gone time? There could be no more appropriate place, but until we are in larger quarters, where full justice can be done to them, I fear we shall have few additions made to those we already possess.

Whilst on this subject I should like, on behalf of the Exhibition Committee, to acknowledge the great assistance we have had from this Institution. Committee rooms were placed at our disposal from November to May, the Theatre was always available for our large meetings, and everything that they possessed that was of interest to the Exhibition was freely lent to us by the Institution; in fact, I may say we stripped it to a gantline; and I know that I am giving expression to the feeling of all our Committees (especially those of Gunnery and Navigation) in acknowledging our great indebtedness

to the United Service Institution generally, and the Secretaries in particular, for their co-operation and assistance.

Except in the weather, we were fortunate in many ways. The Exhibition has the unique distinction of having opened without having borrowed a sixpence, and in having paid its way from the beginning; also we may truly say that everything was in place on the opening day.

The Exhibition was honoured by the visits of almost every member of our Royal Family, many of whom came on two or three different occasions; and several members of the Royal Families of foreign countries also visited us during their stay in England.

What accidents took place were, as a rule, not of a serious nature. One small fire occurred in Gordon House, which was quickly extinguished; and one more curious is thus reported by the Electrical Engineer: "Outside the office of Messrs. Siemens Bros., adjoining the electric light shed, this firm had erected a sign, the letters of which were made with glass tube, exhausted and filled with rarefied gas in the usual manner of Geissler's tubes. The sign was to be illuminated by the discharge of the secondary current from a large Ruhmkorff coil in the usual manner. Some of the members of the Committee being expected, it was proposed to put this apparatus in action. The primary coil was connected through a resistance as a bye-pass to one of the circuits on the switchboard, and a pair of insulated wires led from the secondary terminals to the device outside. The experiment had not been started long before the high tension secondary current commenced to spark across between the two insulated wires. This was not noticed until the sparking had heated the insulated coating so much as to cause it to smoke; once noticed, it was a simple enough matter to put a stop to, by disconnecting the wires; but before this could be done the situation was rendered somewhat dangerous by some individual amongst the visitors taking action not wisely but too well. Noticing the smoke, he proceeded to quench it by throwing on water. The result was, of course, to make an effectual short circuit at the point where the sparking had occurred, and to cause the wires to become instantly heated to such an extent as to set the wood work on fire. This was fortunately arrested before much more than the scorching of one or two match-lining boards had taken place." Soon after I received a request from this gentleman for a season ticket as a reward for what he called "putting out the fire so promptly."

The financial result, and the total number of visitors, it appears to me, satisfactorily answer the question as to whether the public appreciated the Exhibition. It was talked of in the distant parts of the country. Those who did not visit it lamented that they had lost their opportunity; and many who had seen it regretted they had not gone oftener. Every effort was made to give information by catalogue, pamphlets, and lecture, and the willingness of the sailors in charge of appliances and exhibits to answer questions over and over again was often remarked on.

The fact is there is always amongst English people an innate love for

everything appertaining to the sea—a feeling often dormant, but always there. The rush from place to place to follow each event of the programme, the desire of the programme boys to go to sea, and the questions asked so constantly, showed the interest taken in the Service.

In the Art Gallery were a set of engravings of English dockyards, about 100 years old. These were for sale. A lady called on me in much alarm lest some foreign Government should get hold of them and turn them to account when the great invasion took place.

The question arises, Has the Exhibition added to the popularity of the Navy? If, as I am informed, the holding of the Exhibition has been to stimulate recruiting for the Service, I think that alone would justify us and repay us for our trouble; and it will be interesting to see if the increase in recruiting is kept steadily up, or whether it is merely a flash in the pan. I believe, myself, that the best method of recruiting is to let the boys be seen, and that a boy returning to his own village after six months in a training ship, well dressed, well drilled, and well fed, and with the extra amount of side he would probably put on from knowing the ship's corporal was not round the corner, would do more to attract others than any recruiting sergeant. For this reason I regret that the boys from the Plymouth ships could only be brought up to the Exhibition through the private generosity of the mother of a naval Officer, and that the Portsmouth boys, though so much nearer London, could not be brought up at all, notwithstanding the inducements we held out.

The total number of seamen and marines up for drill was 624, and of these, one man only was sent back to his ship, no other complaint of any sort having occurred, either in the grounds or barracks.

Considering the circumstances and the novelty of the situation, and the temptations to which the men were exposed both in and out of the Exhibition, this must be considered a most gratifying proof of the great change in our seamen during the last thirty years; and I think you will agree that it is due to them to place this fact on record. Many causes have led to the improvement in our men, but amongst them I have a theory that the mechanical improvements now applied to the working of guns, the delicate and scientific instruments which they have to handle in connection with submarine mining and torpedo work, requiring skill and care to prevent accidents, have tended to make them more reflective and thoughtful, and consequently more reliable. Just as the skilled mechanic is more thoughtful and better educated than the navvy, so is the seaman of to-day superior in many ways to the man who lived in the "Flog the last man off the yard" period.

The employés of the Exhibition also were all old seamen or marines, many of whom got further employment when we had done with them. They were granted certificates of conduct, but it was a matter of regret to me that several asked me not to add the word "pensioner," as they said when this was seen they were offered less favourable wages. I hope that employers of labour when engaging our seamen will look on a pension enjoyed by a man as an extra

mark of good conduct, and that they will feel warranted in paying these men a fair remuneration and not discount their characters.

The number of visitors, as you know, was 2,351,683. The surplus profit, when made known, will, I think, compare favourably with other successful Exhibitions and form the nucleus of a new charitable fund. You are aware that with reference to this fund a special resolution was passed, long before any prospect of its existence was seen, to devote it to the one special object of relieving the widows and dependent relatives of men dying in the Service. Many applications for grants for charitable purposes have been made to us during the run of the Exhibition, and this resolution, so wisely made, has been strictly adhered to, and has prevented the fund from being frittered away in small grants to various charities, which would not much have enriched them and would have left us poor indeed.

The fund itself will be invested in the name of certain trustees (of whom H.R.H. the President has graciously expressed a desire to be one), and worked as a separate charity under a title which will always identify it with the Royal Naval Exhibition of 1891.

As it is, it will prove totally inadequate to fulfil the requirements even as a supplementary charity to Admiralty pensions, which are themselves confessedly insufficient. It is to be hoped that eventually the Navy may be placed in such an independent position that they may not have (on the occurrence of every catastrophe) to appeal to their countrymen for help; and if the public will only second the efforts we have made, and supplement this fund as it deserves, we shall soon be on the high road to that position. The fund will be worked in a practical and economical manner, much gratuitous assistance being rendered by many of those who have helped to make the Exhibition a success. It is a charity that none can cavil at, and must appeal, I think, to all who are interested in the widows and orphans of those men who go to sea for them, and who will have to stand in the first line of defence.

For comparison, I may state that at the Manchester Exhibition, 1887, there were 4,765,137 visitors; estimated surplus, 43,239*l.* The estimated surplus arising from the International Exhibition of Industry, Science, and Art at Glasgow, 1888, was 41,079*l.*; and when our balance-sheet is ready, I hope it may bear comparison with those of the Exhibitions mentioned. This will be a suitable time to mention the fact that every conceivable precaution was taken with regard to insurance, both against the accident of non-opening, against visitors' and workmen's risks, all risks to loan exhibits, and loss of gate money from having to close partially or wholly.

Altogether insurances to the amount of 370,886*l.* were effected, the amount of premiums paid being 1,353*l.* 2*s.* 5*d.* The fact that, out of this enormous amount, only 108*l.* 12*s.* 9*d.* was claimed from the underwriters is the most conclusive proof that could be given of the care bestowed in receiving, guarding, and returning the enormous number of articles, large and small, that were entrusted to our care. I shall not bore you with more statistics, except to state that the

number of letters received up to this date is about 35,000, and that the letters, book packets, &c., posted by us number 45,000.

Now that it is all over I ask myself, Could we have done any better? Of course we made mistakes; but, as the late American Minister to this country said in one of his last speeches, "The man who never makes mistakes never makes anything." I take it, there is no finality to Exhibitions; indeed, a United Service Exhibition was talked of whilst this paper was being written; but it came to nothing, its existence being of so brief and ideal a nature as to suggest to me the Baby's Epitaph. However, it is more than likely that, even in our own time, encouraged by the support we have had, and the interest shown by the country at large, another Naval Exhibition will come off.

Therefore, the records of this one may be overhauled, and if my paper leads to a discussion which will bring prominently out the mistakes we made, or any suggestions for the future, it will be of interest to those who worked at the, to us, novel undertaking, and cannot fail to be of some service to those who may follow us.

I believe, myself, in one or two cases we should have done better if we had granted concessions purely on a system of percentages on the profits, instead of taking a lump sum down, notably in the case of the Panorama of Trafalgar and the Shooting Gallery; but it is so easy to be wise after an event. A question was raised as to whether an additional charge should be made for admission to the "Victory," but this was negatived almost unanimously; and I think we took undoubtedly a great deal of the money we might have got at her gangway at the gates, and avoided any chance of complaints of extra charge.

At the same time, it must be remembered that allowing each visitor *once* through the "Victory" at 3*d.* would have brought us in roughly 29,396*l.*, and at 1*d.* 9,798*l.*

I have tried to deal with the subject of the Exhibition from a broad point of view, and have not attempted to take the exhibits in detail, as it would be an endless task, and the catalogue supplies this information. We may say it has been an experiment on the part of the Navy, and it has proved undoubtedly that your seamen may be relied on, even in the midst of the temptations of London, to preserve their self-respect; nor have I heard that their time spent up here resulted in any opinion of their Commanding Officers that they had fallen off in discipline. Of course it may be considered an innovation, and contrary to the traditions of the Service, but Lord Lorne, quoting from Canning, says:—

"Those who have checked improvement because it is innovation will one day or other be compelled to accept innovation when it has ceased to be improvement."

We live in a progressive age, and one more or less of advertisement, and must not cling too closely to tradition, if by departing from it we can add to the security of the kingdom by popularizing, in no matter how small a degree, the Service on which in time of war so much will depend.

In addition to the appreciation shown by the public of an outdoor place of harmless and rational amusement such as was afforded by the Naval Exhibition, I believe they imbibed an amount of instruction and knowledge on naval subjects which cannot fail to be productive of good; and I quote from a speech of the First Lord of the Admiralty at the opening of the Liverpool Naval Exhibition. Lord George Hamilton said he felt confident that the Exhibition would, though perhaps on a small scale, prove as great a success as the greater Exhibition held in London; and the result of the Chelsea Exhibition, both financially and as an educational instrument, had far exceeded the most sanguine hopes of its promoters. The great value of such an Exhibition was, he thought, independently of the pleasure which was given to the visitors, that it brought home to them the unrivalled position we had attained as a mercantile and commercial Power. He hoped the result of all these Exhibitions would be to bring home to all sections of the community the absolute necessity for maintaining their Navy in an effective state of strength, and that they might be instrumental in forming among men of all political parties the policy which would be continuous in its result, and which would ensure that the Navy should, both in sufficiency and efficiency, be equal to the onerous duties that in time of war and of emergency might be placed upon it.

The result of the Exhibition has forced upon me one or two considerations, which I give for what they are worth; and, first and foremost, I think it is patent that the Exhibition has justly earned the right to be looked upon as a national event, which has given the public an insight, not only into the traditions of the past, but also into the present life afloat; and they have been able to see the costly weapons, machinery, and fittings, and the countless thousands of articles which go to complete a modern man-of-war, and has thus reawakened in them the interest they have always taken in the Service, but which is apt to slumber in the piping times of peace.

It has stimulated the recruiting to a large extent, and, by affording instruction and amusement, has undoubtedly added to the popularity of the Service.

Another consideration is the great want of public ground, in an accessible situation, which could be leased at a moderate rent, be used as a recreation ground, and yet be available for these Exhibitions.

Already the cry is, "What shall we have next summer?" thus showing that the public have already acquired the habit of looking for an outdoor place of rational amusement, a habit that I maintain the Military Exhibition and our own have done much to strengthen, and, had such a piece of ground as the one I speak of been available, we should have saved for our charity, at any rate, some of the 7,854*l.* we have had to pay for goodwill, rent, restoration of grounds, and so forth.

In conclusion, whilst I may point out that I am painfully conscious of my inability to put before you anything calculated to make this paper novel or attractive, I have given you my ideas partly with the hope that in the distant future the Executive of another Naval

Exhibition (where improvements in ships and armaments that we can only dream of, or guess at by the rapid and startling changes that have taken place in our own time) may be able to say at least of us that we have tried to give the best illustration of the Naval Service of the present day that time and opportunity have allowed us.

THE ARTS SECTION OF THE ROYAL NAVAL EXHIBITION.

By Major L. EDYE, R.M.L.I., Hon. (Arts) Sec.

MY LORDS, LADIES, AND GENTLEMEN—Sir Alfred Jephson has in his usual terse and brilliant style given you a brief history of the Royal Naval Exhibition, and the advantages which are likely to accrue to the Naval Service therefrom, and it now becomes my privilege, with his consent and your approval, to supplement his more than interesting paper with a short, and I sincerely trust interesting, account of that section to which I had the honour of acting as Hon. Sec.

Archdeacon Farrar has very truly said that, "Art is the reflection of history; it is an illustrative chapter in the autobiography of nations." These words might well have been chosen as our motto, had we been disposed to select one, as is often the case in the formation of picture galleries having for their *raison d'être* any specific or special subject such as our Art Galleries contained, but we were content to allow art in our case to speak for itself; we preferred to allow "the consciousness of emotion in the presence of the phenomena of life and nature" to be our guide, and the foundation on which we disposed to appeal to the sympathy of a great national people who, if they have not hitherto been quite a picture-loving race, have certainly never failed to recognize and realize the magnificent heritage which has been bequeathed to them by their ancestors whose prowess by sea and doughty deeds we were anxious to depict on the walls of the Art Galleries of the Naval Exhibition.

The history of the Art Section may be briefly summarized as follows:—

As soon as the preliminaries for holding an Exhibition had been completed, and the Art Committee duly elected, it was determined under the guidance of its Chairman, Admiral Sir Edward Inglefield, to ascertain if the gallery which had been only a few months before used as the Battle Gallery of the Military Exhibition contained sufficient wall area to meet our requirements in the event of our most sanguine anticipations being realized.

At the same time a special appeal was made to Her Majesty the Queen, T.R.H. the Prince and Princess of Wales, other members of the Royal Family, my Lords Commissioners of the Admiralty, and the R.U.S. Institution for the loan of such pictures as they might respectively be disposed to sanction.

The result of this appeal, it is almost needless for me now to say, was all that could be desired, and formed the nucleus of that collection of pictures which the great naval families, public bodies, and the public themselves were destined hereafter to supplement, and which has, if I may be allowed to say so, been described as probably the most interesting and valuable collection of art treasures and relics ever brought together in so short a space of time, and by men so little versed or practised in such an undertaking.

This appeal involved the sending out of many thousands of letters and circulars, and was in its result far beyond all expectations, so much so, that our Committee were compelled to approach the Finance and Executive Committees for an increased vote, as well as for increased space.

This demand on the part of the Art Section was, no doubt, of very serious moment, and demanded the utmost consideration on the part of the Executive, especially when it was announced that the additional area required would be considerably in excess of that already granted. The proposed appropriation of this additional space by the Art Galleries naturally involved the exclusion of other exhibits from the building itself, and this consideration was one of unquestionable importance; the result, however, was the addition to the Battle Gallery of the Military (the Nelson of the Naval) of a space of equal length and breadth, but not of equal hanging area, taken from the Howe Gallery, and which was partitioned off from that gallery and the Franklin by two delicately designed screens closed at night by four Bostwick gates.

To this concession on the part of the Executive was added the Music Room of the Military (the Benbow of the Naval), a gallery that had to be subsequently lengthened to nearly double its original size within ten days of the opening of the Exhibition.

The additional space thus placed at our disposal seemed, however, to entirely melt away with the growing interest in the Exhibition which pervaded all classes of society, until the applications for permission to exhibit became so overwhelmingly large that a Sub-Committee of the Arts was appointed with powers not only of eliminating duplicate and other pictures, but subsequently of choosing from those already selected for hanging which we might be compelled to decline for want of room; the result of their report was such that still further space was absolutely necessary, and it was then decided, after due consideration and with professional advice, that thirteen transverse screens should be placed in the Nelson Gallery and a longitudinal one in the Benbow; in spite, however, even of this additional convenience, we were ultimately obliged to decline a very large number of paintings, the most painful duty perhaps our Committee had to perform during its existence, especially considering the extremely representative character from a naval point of view of a large number of those offering loans.

At this stage I may remark that, if two additional galleries similar to the Nelson and Blake had been available, they could have been filled with the very greatest facility; the space, however, at the

disposal of the Executive did not admit of any further extension, and in consequence thereof, our Committee were most reluctantly compelled to refuse some hundreds of most valuable and interesting pictures.

To naval men in particular, to the lover of the artistic and the beautiful, to the public as a body, I venture to say this was an irreparable loss, an almost pitiable sorrow, but it was in view of time, space, and public consideration inevitable, and only suggests the truism of those ideal lines,

“To prove what amplitude in store
Lies just beyond the entrance door.”

At all times the formation of an art gallery on the loan system presents considerable difficulties, and it must not therefore be considered that because we had overwhelming offers, the Art Section of the Royal Naval Exhibition met at all times with unbounded success; it has unfortunately to regret the absence of several pictures of considerable historic and naval interest that should have been in their places, but were not so for various reasons.

The Sub-Committee of the Art Section, over which Rear-Admiral W. R. Kennedy presided, having after the most careful consideration determined on the various pictures and relics to be accepted, proceeded to the collecting and hanging of the same.

The Blake and Nelson Galleries were especially set apart for oil paintings and relics, the pictures being chronologically arranged in periods commencing with the first, *i.e.*, from the beginning of the 16th century to the commencement of the Civil War, 1642, and terminating with the 12th, *i.e.*, that between the era of the new Navy in 1860 and 1891; whilst the relics were placed as near as possible to the portraits of those to whom they originally belonged, or with whom they were in a measure intimately associated.

In this work the Committee were guided by a previously drawn up “Synopsis of Portraits, Battle-pieces, Figure-subjects, &c., with relation to prominent periods of British Naval History,” which will be found on pages 20 and 21 of the Official Catalogue, as also an interesting summary of a more elaborate and perhaps unique character, being a “Chronological List of the Chief Services of the Royal Navy and Royal Marines,” a compilation which will also be found in the Official Catalogue (pages 22 to 62), and which has met with almost general approval, commencing as it does with the action off Brest and burning of the good ship “Regent” in 1512, and terminating with the blockade of the Zanzibar coast in 1890 by the East Indian Squadron, under the command of Vice-Admiral the Hon. Sir E. R. Fremantle.

To Professor Laughton, R.N., Mr. Laird Clowes, and Commander C. N. Robinson, R.N., who were associated with Admiral Kennedy as members of the Art Sub-Committee, we are deeply indebted for the assistance they rendered in the compilation of these two very interesting works, which enabled the Hanging Committee with comparative ease and comfort, assisted by Mr. Frank Baden-Powell, to

arrange and place the various pictures and relics to the best advantage.

It is not intended to offer any apology for in a few cases the imperfect artistic hanging of pictures, the want of attention to the blending and grouping of colour, nor to in many cases the want of more careful and judicious hanging of portraits and sea-pieces; we claim no artists' licence, having determined to proceed on purely chronological lines, and to trust that out of chaos a bright issue might result.

It would be impossible for me during the short space of time allotted to a lecture to give you even a very brief *résumé* of the great deeds which have made the Navy of England pre-eminent amongst all others; nor, indeed, is it within my province to do so. I may take you back to the "long ships" of Alfred, to the fact that "he was the first English Sovereign who commanded the fleet in battle, and may, therefore, be described as the first Admiral;" to Edgar, who, on doubtful authority, is said "to have claimed the title of King of the Seas;" to Canute, who "owed his crown to the Navy;" and later, to the historical part played in the naval history of this country by the Cinque Ports, first against William the Norman in 1066, and last, but not least, to the share taken by them in the destruction of the Spanish Armada.

These events are all historical; they form and are the charter of our liberties, but their path has as yet never been touched by the brush of the modern painter, and hence finds no place in our galleries.

But, although pictorially we were unable to exhibit any striking sea pictures of pre-Armada date, the very interesting series of relics lent by the Cinque Ports carry us far beyond that epoch; of these, perhaps the most ancient if not the most interesting, giving any idea of the ships of the period, was the seal of the now extinct Corporation of Pevensey. This seal (No. 2,021), the most antique of the Cinque Port seals, dating from early in the 13th century, was a splendid work of art in itself, bearing on the obverse side a ship with lofty poop and (embattled) forecastle, with the legend "Sigillv: Baronvm Domini: Regis: Anglie: de: Peuenes" ("The seal of the Barons of our Lord King of England of Pevensey"), and on the reverse two ships with their sails torn to shreds.

Thus after a lapse, we may fairly say, of upwards of nearly 700 years, the shipwright of the latter end of the 19th century was able to examine, with absolute freedom and at his ease, the form of vessel which served to make, even in the 12th century, the name of England respected by all the maritime nations of that century.

Apart, however, from the evidence of this and other seals, there were a series of charters of almost priceless value, dating from 36 Henry III (1252) to 28 Elizabeth (1586), mostly referring to concessions on the part of the Crown to the Barons of the Cinque Ports, in consideration of naval services rendered or to be rendered, but all referring to naval subjects, and each one indicating the important part played by the confederated ports chartered by Edward the Confessor, the two ancient towns added by Henry II, as well as the other towns which subsequently joined the confederation.

It is to Captain Montagu Burrows, R.N., one of our most distinguished scholars in modern history, that we are indebted in a great measure for the decision arrived at by the officials of the Cinque Ports by which this very valuable collection of treasures was placed at our disposal, illustrating, as they did silently, "The Royal Navy of the Cinque Ports," a collection which was not only the delight, but the wonder, of antiquaries and artists, and who during the whole period the Exhibition was open were ever in search of more detailed information than was perhaps accessible to them in the catalogue, and on no subject perhaps more so than in connection with the ship or burgh horns lent by the towns of New Romney, Faversham, Folkestone, Hythe, Dover, and Sandwich, which seemed to command more than ordinary interest, especially from foreigners of almost every nationality, and of whose deep interest in these unique exhibits we had constant opportunity of judging.

Of pre-Armada pictures our galleries could only boast five of any fixed date; of these the oldest was that of the portrait of Thomas Howard, third Duke of Norfolk (No. 203), Lord High Admiral of England, a member of one of the most distinguished naval families of the 16th and 17th centuries, whilst the other most noticeable was Her Majesty's picture (No. 211) of the embarkation of Henry VIII at Dover, on the 31st May, 1520, to meet Francis I of France, on the Field of the Cloth of Gold.

In the Blake Gallery this picture, I think it may be fairly said, claimed more attention than any other, not by virtue of any great apparent artistic merit, but rather owing to the quaint rendering of its subject matter.

Passing on, I think we may justly be allowed to say that the collection of portraits of Armada heroes was almost as near perfection as possible.

Lord Howard of Effingham (No. 222), his Vice-Admiral, Sir Francis Drake (No. 217), his Rear-Admiral, Sir Richard Hawkyns (No. 219), were all present, silent witnesses of the mighty struggle that took place at this period for the supremacy of the seas, whilst it may be interesting to note that these portraits were severally lent by a descendant bearing the same name.

To the Duke of Norfolk we are indebted for the portrait of the Lieutenant-Governor and Commander-in-Chief "of the Navy and Army prepared to the seas against Spain," as he was then styled; to the Lady Elliott-Drake and to Mr. C. Stuart-Hawkins we are indebted for the portraits of the two subordinate Admirals.

But we still find representatives of this great fight in George Clifford, Earl of Cumberland (No. 208), who commanded the "Elizabeth Bonaventure," a ship of 600 tons and 250 men, and who conveyed to Queen Elizabeth the despatches announcing the dispersal of the Spaniards off Gravelines; Sir Martin Frobisher (No. 224), who commanded the "Triumph;" and Sir Richard Leveson (No. 225), who as a lad of eighteen served against the Dons.

To Mr. Seymour Lucas we are indebted for that charmingly-painted picture of the surrender of Don Pedro de Valdez, the haughty com-

mander of the Andalusian flag-ship, the "Nuestra Senora d. Rosario" (No. 223), a subject which he has treated with such dignity and accuracy of detail.

Loutherbourg, Admiral Beechey, and Mr. Frank Baden-Powell have each furnished pictures giving different periods of the great 16th century struggle: Loutherbourg, the fight itself (No. 212); Admiral Beechey, the part played by the fire-ships (No. 221); whilst Mr. Baden-Powell, in a painting full of colour, detail, and almost life-like character, puts in "Our Last Shot" (No. 226), prior to the home fleet hastening back to England to avert the fury of the rising gale, which was bound to complete the destruction of the retreating remnants of Spain's mighty efforts to sweep the English Fleet from off the seas.

Amongst those who played an important part in the naval history of those days, we must not forget Sir Walter Raleigh (No. 209), Thomas Cavendish (No. 218), Robert Devereux, Earl of Essex (No. 213), and Sir Hugh Willoughby (No. 220), all of whom were duly represented.

I have dwelt somewhat longer perhaps on this Armada period than is consistent with the limited time at my disposal, but if so I would claim your indulgence in view of the important part it played in the history of our country, and to explain that it was the desire of our Committee to emphasize to our visitors that period which might be described as the dawn of our permanent navy.

From the year 1588 (which includes the Cromwellian era) to 1660 there is much to record. Blake (No. 227), Ayscue (No. 235), Penn (No. 245), Lawson (No. 231), Monck (No. 249), and Deane (No. 233) waged dire strife against Holland and Spain; of Blake there were two portraits differing considerably from each other; one lent by the Wardens and Fellows of Wadham College, Oxford, of which University Blake was himself a graduate, whilst the other was lent by a descendant in the female line; the remaining portraits being lent by my Lords Commissioners of the Admiralty.

The wars of the Restoration era (1660—1688) gave us a Royal Duke as a Lord High Admiral (No. 256); a Percy of similar rank (No. 236); Tyddiman (No. 237), who as a Vice-Admiral failed in his attack on Bergen; Myngs (No. 238), who was killed as a Vice-Admiral whilst gallantly leading Prince Rupert's division in the memorable fight off the North Foreland; Sir Joseph Jordan (No. 240), who was an Admiral at Solebay; Edward Mountagu, Earl of Sandwich (No. 242), who perished in the battle of Solebay, where his flagship, the "Royal James," was blown up with a loss of nearly the whole crew; and a host of other distinguished men, all of whom found a place on the walls of the Blake Gallery, and whose names will ever remain green in the memory of all true sailors. In connection with many of the names I have mentioned, there are two very interesting facts, one of which certainly should be recorded, whilst the other is only of passing interest.

In "Pepys' Diary" (1666), vol. ii, p. 385, he writes as follows:—

"To Mr. Lely's the painter's and there saw the heads—some

ished and all begun—of the flagg men in the late great fight with the Duke of York against the Dutch.

“The Duke of York hath them done to hang in his chamber, and very finely they are done indeed. Here are the Prince’s (Rupert), Sir George Asku’s, Sir Thomas Teddiman’s, Sir Christopher Myngs’, Sir Joseph Jordan, Sir William Berkeley, Sir Thomas Allen, and Captain Harman’s, as also the Duke of Albemarle’s; and with he my Lord Sandwich, Sir William Penn’s, and Sir Jeremy Smith’s.”

Thus are preserved to us, painted by one of the most distinguished artists of the day (Sir Peter Lely), a veritable autobiography on canvas of those men who against the Dutch Admiral Opdam’s mighty fleet maintained the honour and supremaey of England’s flag.

When these pictures were handed over to us, they were in due course hung, the names of the several representatives being clearly painted in black letters on gilt tablets, which were attached to each frame; none of our staff had any idea of any inconsistency existing amongst them, and it was not till our first dusting day by professional cleaners that it was discovered that Admiral Myngs had changed frames with Admiral Tyddiman; how long this imposture had been going on it is impossible to say, but it may have been for years.

The other picture of this period which deserves some notice was a fine painting, 12 ft. by 8 ft., by an unknown artist, and entitled “The Embarkation of Catharine of Braganza to marry Charles II of England” (No. 260); it had an insurance value thereto attached of 500*l.*, and was hung on the line next to another, the Battle of Solebay (No. 262), lent by the Earl of Sandwich, and painted by Van de Velde. It was the fate of both pictures to be in close juxtaposition to one another by virtue of their dates, and it was perhaps lucky that it was so, for as soon as a careful study of each picture had been made, it became self-evident that both pictures were by the same artist; the treatment of colour, water, design of ship, their form, decoration, rig, &c., all spoke for themselves, and the unknown artist was almost unanimously declared to be Van de Velde, a decision which I am sorry to say in the interest of the Exhibition raised the insurance thereon from 500*l.* to 5,000*l.*

Coming to the 4th period, we find Sir John Leake (No. 232), who commanded the van at Malaga; Sir George Rooke (No. 254), who captured Gibraltar in 1704; Sir Cloudisley Shovell (No. 257), who perished with all his crew off the Scilly Isles in 1707; George Legge, First Lord of Dartmouth (No. 259), who died in disgrace in the Tower; Sir Robert Holmes (No. 264), who took New York; and Samuel Pepys (No. 265), the diarist. It was a period of comparative rest, although the battles of Bantry Bay, Beachy Head, La Hogue, Vigo, Malaga, and the taking of Gibraltar are notable landmarks.

It was also during this period, as may have been seen, that Captain Kempthorne (No. 283) fought his celebrated action single handed with seven Algerine pirates, which has been immortalized in the following lines:—

“ Two we burnt, two we sank,
 And two did run away,
 And one we carried to Leghorn Roads,
 To show we'd won the day.”

The struggle between the English fleets and those of France and Spain continued during the 5th and 6th periods, and contributes the usual number of distinguished men to the walls of our galleries; amongst them we find George Byng (No. 294), afterwards Viscount Torrington, who entered the Navy as a “ King's letter boy,” and who afterwards gained the brilliant victory over the Spanish fleet off Cape Passaro; Sir John Balchen (No. 295), lost in the “ Victory ” off Alderney in 1744; Benbow (No. 303), who was mortally wounded in his action with the French Commodore du Casse; Admiral Thomas Mathews (No. 306), who was tried by Court-Martial for allowing a French fleet to escape, and found guilty; Edward Vernon (No. 310), who captured Porto Bello, and was as an Admiral afterwards struck off the list; Admiral Thomas Smith, “ Tom of Ten Thousand ” (No. 311), as he was called by the men, President of Admiral Byng's Court-Martial; Edward Boscawen (No. 315), who reduced Louisbourg; and Admiral George Anson (No. 321), who was raised to the peerage for his defeat of Admiral de la Jonquière off Finisterre.

These and many others whose names are too numerous to mention had each their respective places in our galleries.

Of sea pieces of this period, one, a charming little painting, “ The Taking of Porto Bello ” (No. 312), by George Chambers, illustrates the want of care sometimes exhibited by artists in painting naval and military subjects, for here we have the ensign shown by each of the English ships engaged as that authorized by the Union in 1801, whereas the action itself was fought in 1739, or nearly three-quarters of a century before.

To chronicle the events of the 7th, 8th, and 9th periods is an almost impossible task, except to point out that nearly all the most distinguished naval Commanders of the period were duly represented, including Sir Edward Hughes (No. 336), who fought five distinct actions with the French Admiral Suffren; Hawke (No. 340), who defeated Marshal Conflans in Quiberon Bay, and subsequently became a peer for his distinguished services; Admiral Viscount Keppel (No. 342), who commanded the “ Valiant ” at the Battle of Quiberon Bay; Samuel Barrington (No. 351), who reduced St. Lucia, and defeated the French under d'Estaing; Lord Rodney (No. 357), who obtained a signal victory over De Grasse in 1782; Captain James Cook (No. 358), the renowned circumnavigator; Kempenfelt (No. 364), who was lost in the “ Royal George ” at Spithead; Samuel Hood (No. 366), who commanded the “ Zealous ” at the Nile; Hyde Parker (No. 317), who was lost with all hands in 1783, and Thomas, Lord Graves (No. 334), who was second in command on the memorable 1st June, 1794.

Of the more renowned men of this period it is impossible to go into details; the lives of most of them have been fully written, and it would take a far more able pen than mine to even draft the shortest

récis of their respective careers; it must be sufficient, under the circumstances, if I merely refer to them as Lord Howe (No. 332), Viscount Bridport (No. 399), the Earl of St. Vincent (No. 375), Viscount Duncan (No. 441), Lord de Saumarez (No. 380), Sir Robert Calder (No. 401), Lord Collingwood (No. 407), Sir John Duckworth (No. 417), Lord Hood (No. 399), Lord Dundonald (No. 498), Viscount Exmouth (No. 412), the immortal Lord Viscount Nelson (No. 570A), remarking that all were duly represented, and in nearly every case by the most distinguished artist of their day.

Before closing this list treated so summarily as regards their great deeds, I must not fail to mention the fact that the portraits of living Officers were strictly prohibited, and that this decision was rigidly adhered to in every case; indirectly the portrait of one Officer did appear to the very last, but, although such was the case, it was entirely through an oversight on the part of the Hanging Committee.

A few distinguished men have occupied public attention between the Nelsonian era and our own, such as Bounty Bligh (No. 402), Sir Robert Stopford (No. 397), Sir Charles Napier (No. 571), Sir Michael Seymour (No. 463), Sir George Martin (No. 480), Sir George Cockburn (No. 490), Lord Dundonald (No. 498), the hero of the "Shannon," Sir Philip Broke (No. 613), Sir Byam Martin (No. 621), Lord Lyons (No. 633), Sir William Parker (No. 639), Sir William Peel (No. 642), Sir James Hope (No. 750), and last, but not least, the pioneer of Lord Wolseley's advance on Tel-el-Kebir, poor Wyatt Rawson (No. 746), who thus brings to a close the twelve periods into which the history of the Navy was divided by our Committee.

Turning to the sea or battle pictures, it will be an interesting fact to note that no less than five paintings by Van de Velde, which were on view, were recovered after a lapse of many years from the annual attentions of the whitewasher—I refer to those lent by the Mayor and Corporation of Sandwich (Nos. 261, 268, 269, 270, and 271 in the catalogue), which were discovered some sixty years ago behind the plaster of an old house in Harnett Street, Sandwich—whilst another curious old painting (No. 210) seems for years to have found a temporary home in Canterbury Cathedral. Of this class of picture, those to which most attention was paid by the public in general were the "Destruction of the French ships in the Bay of La Hogue" (No. 296), lent by the Duke of Westminster; Colonel Cornwallis West's three exquisite pictures (Nos. 475, 476, and 477) by Gilbert, of the retreat of Admiral Cornwallis under conditions creditable to himself and his country; Commodore Nelson boarding the San Nicolas (511) followed by a detachment of the 69th Regiment then serving as marines; Nelson boarding the "San Nicolas" and "San Josef" (Nos. 514 and 517) respectively; Nelson receiving the swords of the Spanish Officers on the quarter-deck of the "San Josef" (No. 522); Harry Coll's characteristic picture (No. 552) entitled "Daylight;" the "Lion's Cubs" (No. 651), by F. W. Lawson; "The 'Victory' taking possession of a prize" (No. 599), by W. H. Overend; M. Ballin's two charming pictures

(Nos. 608 and 616) lent by the Trustees of the Royal Naval Club, Portsmouth; and, lastly, with all its historic faults, Maclise's well-known picture (No. 586) of the death of Admiral Lord Nelson, around which there was always a dense, sympathetic, and admiring crowd.

But distinguished as were the men who were thus depicted on our walls, the collection was not only unique in its historical interest, but it was little less so in artistic merit, having representative works of such masters as Abbott, Dahl, Gainsborough, Hogarth, Holbein, Hoppner, Sir Godfrey Kneller, Sir Peter Lely, Sir Thomas Lawrence, Louthembourg, Mytens, Opie, Sir Joshua Reynolds, Romney, Raeburn, Serres, W. I. M. Turner, the two Van de Veldes, Voipe, Vandyck, Benjamin West, Zucharo, and a host of other artists of the highest professional attainments.

Passing from the Blake and Nelson Galleries to that of the Benbow is merely a transition from oil to water colour, mezzotint, engravings, and prints of what has already been noted in the other galleries, but with hundreds of additional portraits, battle pieces, &c. To Messrs. E. and E. Emanuel, of Portsea; the Trustees of the British Museum; Sir J. Campbell-Orde; Lord de Saumarez, and Mr. R. J. Roddam, our Committee are deeply indebted for the best individual collections, that of the first-named being not only the largest, but certainly the most choice.

Coming to the water colours section, we find Her Majesty, H.R.H. the Prince of Wales, Admiral H.R.H. the Duke of Edinburgh, the Earl of Dundonald, Admiral Sir Edward Inglefield, and Staff-Commander Bedwell the largest contributors; whilst, as regards artists, those most prominent were Van de Velde, Pocock, Schetky, Sir Edward Inglefield, Sir O. Brierly, W. L. Wyllie, Le Chevalier de Martino, O. Norrie, E. W. Cooke, J. R. Wells, and W. F. Mitchell.

The catalogue (if we may be allowed to say so) is so complete in its text as regards the Art Section, and the press have been so liberal in their several reports, that I feel I should only be repeating matter if I were to go further into details on this subject; but when we come to the section containing the humorous side of the Navy, I venture to trust I may be granted the indulgence of trespassing on your patience in mentioning that to Mr. J. Grego, with whom I will associate the names of Commander Robinson, R.N., and Mr. J. Pearson, the Naval Service owes a deep debt of gratitude for the loan of these pictures, which have illustrated to us what a fund of talent for the ridiculous existed in the good old war days, and how every subject, even then, had two sides of the question—the humorous as well as the serious.

The vicinity of these paintings, &c., mostly by Rowlandson, Gillray, Morland, and Cruikshank, was always the centre of a large crowd of admiring spectators, who seemed to appreciate these quaint old representations of an equally quaint and characteristic age.

So quaint, indeed, and so supremely characteristic were these sketches of the customs of the day, that though humorous, and extravagantly exaggerated, they nevertheless seem to convey most un-

questionably the peculiar conditions of the Service as existed when the brush gave them birth.

To the student of all details connected with the Navy, and especially of portraits, there was one subject upon which it was hoped the Exhibition would, at least, have thrown some additional light, but it would appear that little is to be gleaned thereon and nothing less than printed regulations, if they exist, are apparently of much avail.

I refer to the uniform or livery worn both by Officers and men in years past.

Of the Officers' dress on board ship prior to the introduction of uniform the pictures tell us very little; many of our Admirals are painted, not in their work-a-day rig, but in Court attire, obviously unfitted for sea and ship wear.

It appears, however, that something approaching uniformity had been arrived at prior to 1748, and that the first uniforms were modelled on existing garments, although blue, and white as facings, were substituted for such colours as may have been previously in use.

There was apparently no uniformity up to 1748, and as four important changes took place in the dress of Officers between that date and the end of the century, the absurdity of which Christian Symonds and other modern artists are guilty in labelling their pictures "Admiral of the 18th Century," or "Captain of the 18th Century," is obvious.

The fact that the portraits were labelled with the highest rank held by the person depicted, instead of with the rank held when the picture was painted, is calculated to give rise to totally erroneous ideas on the subject of uniform; No. 332, for example, showed Lord Howe when he was a Captain in the earliest uniform, and was probably painted when he was Captain of the "Magnanime" after Quiberon Bay; in another picture (No. 350), we see him in the uniform of an Admiral of the Fleet (1795—1812), so that it is necessary if we want to know how he was dressed on the glorious 1st of June to look for a third picture, and this we find in No. 546.

The embroidered coats, as sanctioned for Flag Officers in 1748, of which no example apparently exists, but which is described in the "Nautical Magazine," are worn by "Tom of Ten Thousand" (No. 311), the Hon. Edward Boscawen (No. 315), Lord Anson (No. 321), Sir G. Pocock (No. 354), Viscount Barrington (No. 351), Sir F. Geary (No. 327), and Lord Hawke (340).

The portraits of Lord Graves (No. 334) and Admiral Keppel (No. 342) show modifications which seem to indicate that the alterations ordered in 1767 were taking effect, while in Sir Hyde Parker's picture (No. 317) we curiously enough see a mark on the sleeve which did not become regulation until after his death.

Some of the earlier Captains' uniforms are shown in the following, and the date of their commission in that rank given in the biographical notices of the catalogue shows the period to which they respectively belong:—Howe (No. 332), T. Saumarez (No. 322), Shirley (No. 359), Earl of Bristol (No. 360), Roddam (No. 363), Jervis (No. 368—Hopp-

ner's picture), that by Sir W. Beechey shows him as an Admiral of the Fleet (1812—1825) when white facings had again been added to the uniform (1795—1812).

Some very doubtful uniforms are those of Lord Sandwich, Kempenfelt, and William IV.

It is worth while noting that, as a rule, only two kinds of dress were prescribed until quite a late date, full dress and frocks, and twice, viz., in 1767 and 1827, full dress was itself abolished, and the frock, with some little alteration, made the only dress, except a rough weather one. With comparatively few exceptions, men were painted in full dress, the exceptions being usually in favour of a dress worn in battle; Nelson's portrait (No. 585) in West's well-known picture is painted in the Rear-Admiral's frock he wore at Trafalgar, but in Hoppner's picture he is in the full dress of his rank, a dress in which Lord Collingwood appears in No. 407.

It may be noted that, taking the better known portrait painters like Gainsborough, Reynolds, and Hoppner, the dress usually conforms to the regulations, while in the work of others there is a tendency to put in laces and buttons which had no existence in fact.

Of junior grades wearing uniform at this period, in No. 464 will be seen several Officers of Lieutenant's rank which are absolutely correct as regards uniform; and here it may be remarked that, wherever Louthembourg has introduced figures, they are invariably found dressed in their proper livery; No. 467 shows Sir Graham E. Hamond as a Midshipman of the same date.

On the other hand, Mr. Westall, who painted a number of pictures of episodes in Nelson's life (Nos. 479, 524, &c.), allows himself apparently any amount of latitude. He may be correct in his manner of dressing his figures, but he is certainly at variance both with other painters and with the regulations of the period.

A very notable change took place in the dress in 1795, when white facings or lappels disappeared; the order for this alteration does not appear to exist, and although search has been made for it in the Annual Register and other contemporary prints, cannot be traced. The paintings in the Exhibition, however, fully corroborate the belief that some such order was issued, for at the date of the battle of the 1st June, 1794, the Officers are shown with white lappels, whereas, at the date of the battle of the 14th February, 1797, they are shown without them.

Of the uniform of 1795—1812 for Flag Officers, Captains, and Lieutenants, there were many examples in the Exhibition, those of Lords Collingwood and Keith as Flag Officers, Blackwood and Hamilton as Captains, and the Lieutenants in the Nile and Trafalgar pictures were amongst the best specimens.

The uniform instituted in 1812 is the first of which we get minute details, for in 1825 the regulations were issued in book form with plates, Nos. 1,135—42 (these plates were shown by Messrs. Gieve, the naval outfitters, who picked them out of a dustheap some years after they were issued). They were only in force for two years, new instructions being issued in 1827, but they have been largely drawn

upon by artists, and have been the cause of a plentiful crop of errors, for, as a matter of fact, the plates differed considerably from the uniforms with which Officers had supplied themselves in 1812, as anyone may see by comparing them with the pictures of Captain Broke (No. 613) and Lieutenant Sutton (No. 587).

Concerning the costume of the seamen, there is very little to say. Every Naval Officer present is aware that the British bluejacket had no recognized uniform until 1857, although long prior to that date, something like practical uniformity is supposed to have existed, owing to the necessity the seaman was under of obtaining his clothes from the purser. This practice dates from the reign of James I. There was very little indeed on the walls of the Exhibition to give support to this assumption, which also gets a nasty shake, by the way, from Captain Glasscock, who, in his note-book, says, "So much does Jack abhor a purser's shirt and jacket, that for anyone to be seen in them but a 'waister' was, all last war, considered a fair subject for banter and reproach." On the other hand, there is this to be said, that in every picture representing anything in the nature of a sea ceremony, such as Royalty, or a Flag Officer going on board ship, other visits of importance, or such functions as launches, funerals, and the like, the men in the boats are invariably shown dressed alike, and frequently with badges on their arms, as in the case of the crew of Anson's galley, when he went up to Canton, and watermen on the Thames up to within a few years since. For this reason, and because there is much corroborative evidence in books, we might be inclined to think that in the matter of the costume of the men it would be delusive to trust entirely to the figures in the battle pieces, so lately to be seen at the Exhibition.

It is not, however, until we reach the subject of relics pure and simple that our difficulties commence; how out of such a mass of priceless treasures are we to discriminate that which most appeals to our senses; each article has its own merit, each is prized as a gem by its owner? Each is a portion of the history of the Service, and the whole grouped and subdivided into periods, represents the several stages of the naval history of this country.

If we turn to the plate, does not each exhibit speak for itself, does not each article in nearly every case represent the grateful acknowledgment of a grateful people for some victory gained or daring and gallant deed, as evidenced by the munificent gifts presented from time to time by the City of London and Lloyd's Patriotic Fund? Apart from these there are exhibits which, although they do not represent any distinct act or deed, are nevertheless of intense national interest. To the Lady Elliott-Drake we are indebted for the loan of Sir Francis Drake's silver drinking cup (No. 1,929), as also a silver plaque (No. 1,930), engraved on both sides, showing the circumnavigation of the globe by that distinguished sailor. To this section of exhibits, Lord Exmouth contributed no less than three magnificent pieces of plate—a silver gilt centre piece (No. 1,967) presented by the nation to Admiral Viscount Exmouth in commemoration of his services at the Battle of Algiers, the Tarnick Vase (No. 1,968), presented by his

Officers in the Mediterranean, and the Marseilles Plate (No. 1,969) presented by the town of that name as a testimony of its gratitude. The hero of Trafalgar was also represented by a multiplicity of articles, of which we may mention the casket presented with the freedom of the City of London (No. 1,974), a gold box with the freedom of the City of Oxford (No. 1,976); as well as a host of other articles presented amongst others to the Earl of St. Vincent and Lord Collingwood.

But although we have all these mementoes of a period of anger and strife, there were to be found amongst others three trophies, emblems, if I may say so, of a more peaceful era: (1) the magnificent collection of ships, &c., belonging to H.R.H. the Duke of Edinburgh (Nos. 1,978—2,006); (2) the splendid solid silver testimonial presented by the French Government to Mr. Larkins (No. 1,922) as a mark of their high esteem of his labour for the promotion of the International Code of Signals; and (3) the Jubilee Offering of the Royal Navy and Royal Marines to Her Majesty the Queen in 1887 (Nos. 2,008—2,009).

Concerning these models, constructed in pure and standard silver, much has already been written, and the catalogue is so elaborate in its description of them as to need little addition on my part to explain the intricate, delicate, and accurate details of their construction, which occupied close on two years.

They were presented to Her Majesty at Osborne in commemoration of a long and auspicious reign of fifty years: the one typical of the line of battle-ship in use at the accession of Her Majesty, the other a specimen of the large and formidable battle-ship of the year 1887.

Turning to the official papers, we find a mine of wealth; but I must preface any remarks I may have to make thereon by expressing how grateful our Committee were for the valuable assistance received from Mr. T. E. Hodgkin, F.S.A., and Mr. G. Pritchard by the loan of their very choice collections.

Amongst those lent by Mr. Hodgkin, we have a curious "Estimate of the Charge of Victualling Her Ma^{ts} (Queen Elizabeth's) Shippes in Harbor the monethe of June, 1601," by which we learn the seamen were paid $6\frac{1}{2}d.$ per diem, and the "pryncipall maister" had 5s. per week board wages (No. 2,025); a holograph letter from Captain Roger Martin (No. 2,037), whose death is mentioned by Pepys ("Diary," 1st August, 1666) is also interesting, it is a curious effusion, and complains he has no pilot on board "nor any beare but what doth stincke." Amongst the collection may be found contemporary portraits of George Monck (No. 2,033); Martin and Cornelis Tromp (Nos. 2,038 and 2,068); Sir George Ayscue (No. 2,040); Sir Christopher Myngs (No. 2,062); Sir John Lawson (No. 2,044), all stated to be the earliest prints of them known; Lord Sandwich (No. 2,047), the "My Lord" of Pepys; James, Duke of York (No. 2,050); Samuel Pepys (No. 2,101), used only as his ex-libris, and very scarce; and a beautiful portrait of Prince Rupert (No. 2,074) when young, by Symers after Van Dyck; whilst of Mr. Hodgkin's collection of autographs and broadsides nothing can be said but praise.

Mr. Pritchard's collection of autograph letters of the most distin-

guished Admirals of the Service, from George Clifford, 3rd Earl of Cumberland, dated 23rd September, 1586 (No. 2,116), asking Queen Elizabeth for a loan of 10,000*l.*, to that of Admiral Sir Michael Seymour, dated 20th February, 1856 (No. 2,189), are first and last.

The intermediate letters are just as interesting. We have amongst them one of the Earl of Nottingham (No. 2,117*B*), giving us in 1601 the charges for our dockyards; one from Blake and Monck, in 1653 (No. 2,120), asking Captain Holman "an account of what prisoners you have on board, and the names of the Dutch captains, if you have any;" another from Rupert and Albemarle, 1666 (No. 2,121*A*), authorizing Admiral Kemphorne "to weave a blew flag on the mizentopmast head;" another from Admiral Sir John Norris, who, in 1730-31 (No. 2,131), asks for Sir Clowdisley Shovell's sister's son to be promoted in the Service, pathetically remarking, "the only relation he has left at sea;" one from Captain George Vancouver, dated 1793 (No. 2,145), being a signature to an account of stores expended to salute the King at his giving up the island (Owhyhee) to His Britannic Majesty; "made a present to the King by order of Captain Vancouver, one drum complete; burnt for the entertainment of the Chiefs sky and water rockets;" the last letter (No. 2,160) Lord Nelson wrote before leaving English soil, dated "the George Inn," Portsmouth; and lastly, Captain Pipon's report (No. 2,169) of the finding of the home of the mutineers of the "Bounty," at Pitcairn Island. It is needless to remark that the perusal of these and many others form in themselves a charming and interesting chapter of our national history.

To Messrs. L. and J. Parnell we are also much indebted for a very interesting series of "London Gazettes," commencing with an account of the launch of the "Edgar," in 1668 (No. 2,190), to the capture of the French ship "Généreux," bound to Malta, in 1800 (No. 2,225*B*), with troops and other stores.

The value of the individual contributions can, perhaps, be hardly realized. Amongst them we have the return of stores of the "Raynbowe" (No. 2,227), one of the largest vessels which served against the Armada, as also the "booke of all the vyttayling and all other charges bestowed upon the 'Crescente' and 'Hart'" ships (No. 2,229), which formed the Dartmouth contribution to the English fleet to serve against the Armada, giving the names of the Officers of each ship; Admiral Byng's last letter (No. 2,272) to his sister (the Hon. Mrs. Osborne), "I can only with my last breath thank you over and over again for all your endeavours to save me," as well as the justification of his conduct (No. 2,273) made a few minutes prior to his execution, in which he remarks, "Happy for me at this my last moment that I know my innocence, and am conscious that no part of my country's misfortunes are owing to me;" Captain Cook's Journal (No. 2,279), compiled during his first journey round the world, 1768-71; the draft Convention of the Treaty of Copenhagen (No. 2,325), with original marginal notes of Lord Nelson's; the rough signal book of the "Naiad" (No. 2,333), repeating frigate at the battle of Trafalgar, containing the celebrated signal, "England

expects that every man will do his duty;" a log of the weather, in Lord Nelson's handwriting (No. 2,356), from May, 1805, to October 20th, 8 P.M.—his last entry; the signal book of the United States frigate "Chesapeake" (No. 2,372), with bullets attached for sinking it in the event of the ship being captured; a letter (No. 2,373) dated United States frigate "President," taken in United States ship "Chesapeake," with a note thereon, "Enclosed you will receive a copy of certain British private signals;" Bligh's diary (No. 2,401), with notes of observations during the forty-eight days he was in the "Bounty's" launch.

Of Nelsonian letters and papers there was a very large collection, some of official and others of social interest, whilst many were more interesting from their quaint style than from any other consideration. The first I will quote you (No. 2,287) is characteristic of his determination, and is conveyed in a letter to the Governor of St. Eustatius, in the West Indies, and dated from on board the "Boreas," stating that "if a salute of at least as many guns as that given to the French is not paid to the British flag, I must suppose it is an intended insult, and such an insult as I am sure will be properly attended to and noticed;" the original memorandum given by Lord Nelson to the curate of St. George's, Hanover Square (No. 2,302), after the loss of his arm, wherein he remarks, "An Officer desires to return thanks to Almighty God for his perfect recovery from a severe wound, and also for the many mercies bestowed on him;" another (No. 2,331), wherein he remarks, "When I run over the undermentioned wounds, eye in Corsica, belly off Cape St. Vincent, arm at Teneriffe, and head in Egypt, I ought, I think, to be thankful what I am;" to these I think I might add the letter (No. 2,354) of Earl Nelson, referring to his brother Admiral Nelson's body, "I cou'd have wished to have known what was done with ye bowels, whether they were thrown overboard, or whether they were preserved to be put into ye coffin with the body." But, perhaps, of all the references to which I have drawn your attention, none will appeal more to us as members of a profession to which he was so much endeared, as the note from Mr. Bentham to Mr. Kee (No. 2,280) introducing young Horatio Nelson to the purser of the "Seahorse," dated the 28th October, 1773, Mr. Bentham would "be obliged to him for a recommendation in favour of Horatio Nelson, a young lad, nephew to Captain Suckling, and who is going in that ship." Contemplate the events which took place between the date of this letter and 1805, and then realize what share in the world's history this young lad played until, in the cockpit of the "Victory," he breathed his last, at the zenith of his fame, illustrious and beloved by all.

There were yet two letters of interest, which I venture to think should be quoted, as they settle any probability of a controversy on the subject in the future. No. 2,296 in the catalogue is a letter lent by Mr. Edward Dames, and claims to be the first writing of Nelson, after the loss of his right arm. Now on this point there can be no doubt, as evidenced by No. 2,299 (lent by Sir W. Biddulph Parker), a letter written by Sir Horatio Nelson, as he then was, to Sir John

ervis (afterwards Earl St. Vincent), "I hope you will be able to give me a frigate to convey the remains of my carcass to England." "You will excuse my scrawl, considering this is my *first* attempt."

Of snuff boxes, perhaps the choicest was that lent by the Rev. E. Stanley Carpenter (No. 2,423), presented to Captain Edward Carpenter, R.N., after the battle of Navarino; the most historical, perhaps, an oak box (No. 2,447), made from wood of the "Mary Rose," sunk at Spithead, in 1545. The Earl of Northesk contributed twenty-four boxes made from timber or fittings of various old men-of-war mostly engaged in the battles of St. Vincent and Trafalgar, whilst presentation boxes to Lord Nelson, Lord Exmouth, Lord Collingwood, and Lord St. Vincent were amply *en évidence*. None could have visited the Exhibition without admiring the splendid collection of British war medals and decorations, &c., lent by Captain A. E. Whitaker, of the Northumberland Fusiliers. It would be impossible to attempt to describe them, and presumptuous for any one to do so but the owner, who, in a specially printed volume, two copies of which were always at the disposal of visitors to the Exhibition, gives a complete description of each medal, its former owner, and the cause of its award. Of those lent from other sources, perhaps the most interesting belonged originally to Admiral Viscount Nelson (Nos. 2,488—2,499), lent by General Viscount Bridport; whilst Mr. J. G. Murdock added a most valuable collection of commemorative medals. But here again we have a subject in itself, and it is consequently hardly fair to particularize amongst so many exhibits of the utmost value, publicly as well as privately.

In the same manner, taking the list of active service swords and dirks, are they not silent witnesses of what they have each done, and who can tell the trouble many of these now carefully treasured weapons have caused to many a family circle? Of presentation swords there were quite a host, each one speaking on the blade for itself; but of all present, none, perhaps, were of such historic value as the three swords lent by Mr. C. Collingwood Denny (Nos. 2,658, 2,659, 2,660), the swords of the French Admiral Villeneuve, the Spanish Vice-Admiral Alava, and the Spanish Rear-Admiral Cisneros, surrendered to Admiral Collingwood at the battle of Trafalgar.

Beyond these subjects we cannot trespass; to attempt to deal with the relics that were exhibited at the Exhibition is a matter of absolute impossibility, and only to be done in a lecture by itself. Under the circumstances, all that remains for us is to ascertain what is and has been the effect of this exhibition of naval pictures and relics to the people of this our home and country. I do not hesitate to say that no one can possibly calculate the good it has done; the amount of *esprit de patrie* it has created is simply incredible, and perhaps at no period of the country's history has the Naval Service been so popular as it is at the present moment. It is beloved by all, and so long as we can secure the affections of the people, we may rest assured that we have nothing to fear from the terrors of our enemies.

Before concluding, I venture to give you a few statistics, which I

trust may interest you, and which will, I think, be substantial proof that the department had some work to do.

The total number of art exhibitors was 1,022, and the number of exhibits 4,939, including 755 oil paintings; 780 engravings, prints, and mezzotints; 318 water colours; 117 miniatures; 88 pieces of presentation and other plate; 558 maces, charters, autographs, official and private letters, &c.; 69 presentation and other snuff boxes; upwards of 1,500 decorations, medals, and tokens; 158 presentation swords; 44 pieces of sculpture; 76 pieces of china; and 476 miscellaneous relics.

Of oil paintings, 138 were assessed at a value of between 50*l.* and 100*l.*, 279 of from 100*l.* to 500*l.*, 43 of from 500*l.* to 1,000*l.*, 21 of from 1,000*l.* to 5,000*l.*; there were none valued at between 5,000*l.* to 10,000*l.*, but there were 2 valued at 10,000*l.* each.

The total amount of insurance to be covered in the Art Galleries was upwards of 220,000*l.*, of which sum the Lords Commissioners of the Admiralty contributed pictures, &c., to the value of 24,450*l.*, Earl Howe and the Marquis of Bristol 10,000*l.* each, whilst 45 others contributed exhibits valued at between 1,000*l.* and 7,000*l.*

There were 1,209 cases and registered parcels received, of which 625 were packing cases, and 584 parcels conveyed by carrier, post, or by hand.

There were 3,600 letters received, and 3,200 returned circulars, making in all close on 7,000 letters which passed through the post connected with the Art Section, whilst the number of those sent out was over 10,000, including letters and circulars sent.

The staff consisted of 4 clerks, 1 civilian and 3 non-commissioned officers of the R.M.L.I., and after the Exhibition was opened, of 6 attendants (pensioners of the R.N. and R.M.), whose duty it was to clean the galleries before 11 A.M., and to be in attendance throughout the day until 11 p.m.

Special fire precautions were taken to safeguard the property of exhibitors to the Art galleries, so organized that within the short space of 2 minutes and 31 seconds all the relics contained in 140 cases, and numbering over 1,700 different articles, could have been removed to a place of almost absolute safety.

A similar organization existed in connection with the pictures, but although we are unable to give any approximate time for clearing the galleries of pictures, owing to the impossibility of being able to put the same to a practical test (as in the case of the relics), we are in a position to state that the two most valuable pictures in the Exhibition, estimated at 20,000*l.*, would have been clear of the building in a little over three minutes, inclusive of the time taken to remove the relics. Water mains were fitted to each gallery, and firemen were in attendance day and night for the manning of the same, assisted by a select body of police.

The very utmost care that could be devised was taken to protect the pictures from damage owing to the structural conditions of the building and damp weather; and to such an extent was this carried out, that 1,116 hours were spent by professional cleaners in keeping

the pictures in order, a period of time equivalent to $139\frac{1}{2}$ working days of 8 hours per diem for one man.

The Exhibition closed on the 24th October, and on the following Monday the work of returning the various exhibits commenced. The staff employed was 22 men, the working hours being from 8 A.M. to 4 P.M., Saturdays included, and in 32 days the whole of the artworks, with the exception of one letter, were returned safely to their respective owners.

Messrs. Bourlet were appointed to collect, hang, pack, and return the pictures, &c., and it is certainly due to their zealous care that no accident nor loss occurred.

The total approximate cost of receiving, hanging, cleaning, un-hanging, delivering, and in several instances sending workmen to re-hang the pictures and replace sculpture, amounted approximately to 1,100*l.*, but this charge is exclusive of postage and of the general office expenses; whilst the cost of repairing damage done to pictures, their frames, or cases, amounted to only 47*l.*, a result so eminently satisfactory as to be almost beyond our most sanguine expectations, as well as beyond precedent, having in view the result of previous Exhibitions.

There is one subject, however, before closing, on which I would venture with every respect to touch. I do so because it is of almost Imperial importance, and is perhaps the most important question that arises out of the ashes of the now partially defunct Exhibition, and that is, that its memory should not be allowed to become dormant. How best then can we preserve it amongst us, and is this likely to be the case if we retain our pictures at Greenwich? Should not our great metropolis be their home, where, joining hand in hand with the relics of this Institution and the models of South Kensington, they might form the nucleus of a collection which would be almost immediately supplemented, if only for safety's sake, by the priceless paintings and relics which are now in the hands of private individuals, and which, from what we have seen and heard during the course of our existence, will never be sent to Greenwich as a last home?

This is a matter on which I will say no more; it is a subject for consideration; it is a point, as I have said, of Imperial importance, and one which is deserving of more than a passing remark.

Rear-Admiral H. F. CLEVELAND: Will you allow me, Sir, to start the hare? It would, I think, be a pity if these two interesting lectures were passed over with merely silent approbation. One reason for addressing you is that I have nothing whatever to say excepting one remark I would make with regard to an omission of my friend Sir Alfred Jephson, who, with that modesty so characteristic of him (you have only to look at his face to see it written there), has neglected to tell us what was the *cause* of this great success of the Naval Exhibition. Gentlemen, it was due to the tact, the constant attention, the amiability, and the business-like qualities of our Chairman, Vice-Chairman, and the staff by which they were surrounded, as well as to the general popularity of the Navy with the public. When I was first invited to take part in it I considered it a most risky business, and I certainly should never have been induced to associate myself with the Executive had I not been anxious to rally round my old chief Sir William Dowell. I think the end has justified the means, and I am very glad that the result has been to

form a nucleus of a fund which I hope will prevent the hat ever going round when any great catastrophe again overtakes us.

Rear-Admiral LONG: As I was in no way connected with the Naval Exhibition I can perhaps give utterance better than some others here to what I am sure are the feelings of the whole Navy—that we are very much indebted to those Officers who have taken the trouble and have been at such great pains for so long a time to make this Exhibition a success. There is just one point one might remark on in the useful papers read, viz., the advocacy of a permanent Exhibition of Naval Pictures in London. I have recently been in Berlin, and also in Vienna, and I was particularly struck with the way in which in their arsenals they had hung up the pictures of all their great national battles and events. They evidently consider that it is part of the duty of the nation to keep these things alive in their memory, so that their young men as they grow up may have an opportunity of knowing what has gone before. I am afraid in my own Service a great many of us have been lamentably ignorant of what has gone before, not to say that we are so at this moment perhaps; and I must say, speaking for myself, I derived a great deal of information from the Exhibition, and I have taken the precaution to have the Catalogue bound, so that I may keep it for future reference. I think that the papers that have been read here will be very useful in that way, as they will go forth to the Service, and people who have not been able to see the Exhibition will, by means of this paper and by the Catalogue, be able no doubt to assimilate a great deal of information which otherwise it would have been very difficult to collect. I wish to tender my sincere thanks to Sir Alfred Jephson and Major Edye for the very useful papers they have read to us.

Admiral Sir VESEY HAMILTON, K.C.B.: I would like to make one remark following Admiral Long. He has always been a great advocate for the increase of our libraries, and I must say the only two books I ever derived any information from, barring the Regulations as supplied by the Admiralty, were two books well known to every person here, "Tom Cringle's Log" and "The Cruise of the Midge," which give useful accounts of the Coast of Africa and the West Indies. I must say that it is one of the grave faults of our Service that we are not supplied, as I believe foreigners are, with libraries under the Commanders-in-Chief, which may be of some use at the stations to which the ships go. I may as well confess that when I was at the Admiralty I did not do much to order it, and I think if we could form any Committee on Naval Libraries Admiral Long is the best man to put upon it. I am sure the lectures have been received by us all with great satisfaction, and if I were to say any more I should only trench upon the privileges of the Chairman.

Rear-Admiral COLOMB: I should like to add, with reference to the library, that since Admiral Sir Vesey Hamilton left the Admiralty, I understand the Treasury have been got round to the extent that they have agreed to the provision of the sort of library which is asked for, and I have no doubt, by-and-by, a little more may be got and we may have still better libraries. As I am on my legs—although one has not much to say when what is to be said has been said so admirably by both the lecturers—I cannot help expressing my appreciation of the wit and wisdom with which Sir Alfred Jephson's lecture was composed. It seemed to me to be exactly the sort of lecture which should be the finale of an Exhibition such as we have been celebrating: it seemed to have left out nothing that ought to have been said and to have said nothing that ought to have been left out. Then I think there is a feature about the Exhibition itself which ought to be dwelt upon as very peculiar. When we were getting into fairly working order at the meetings of the Executive Committee, one day I was sitting beside a gentleman very well skilled in conducting exhibitions. He had been reproaching us for various shortcomings, and he turned round to me and said, "I cannot conceive anything worse managed than this! It is going to be a complete collapse." "Well," I said, "I think the reason of that opinion is, you really do not see what is going on." The lecturer has told us how we were divided up into a great number of small Committees. The Committees were working together synchronously; each of the little groups brought their work to a bigger group; that bigger group brought its work to the Finance Committee, and then it finally came to the Executive Committee; so that really

before we knew what we were about, the whole work was done. As the meetings went on, I felt more and more surprised at the extraordinary success of that method, but then you know, the real truth and strength of the matter was, we did not hear a cross word, we did not hear a sign of disagreement in any department from the very first to the last. I cannot say that there was a leading spirit anywhere, but there were the leading spirits in their proper places, going not beyond their proper places, and then we had the most perfect Chairman that I can possibly imagine to preside over us, and next to that we had the most perfect Secretary. You would all be of my opinion if you had only seen, as I have seen from time to time, Sir Alfred Jephson sitting at the table, smoking a cigarette, writing a letter, surrounded by people demanding this, that, and the other, and Sir Alfred settling everybody, smoothing all down, never losing his temper, doing exactly the proper thing that was to be done, finishing the cigarette and the letter, and the whole group melting away, everyone of them perfectly satisfied that he had got exactly what he wanted. Might I say one thing which I intended to have begun with, and I do not like finishing without saying it? What we want is the presence of Sir Geoffrey Hornby more often amongst us than it has been. I hope that he is going to turn over a new leaf and come here sometimes. He does not know how badly we want him, and he does not know how much we want the honour of Chairmen such as he is, attending our lectures.¹

Admiral Sir WILLIAM DOWELL, K.C.B. : I suppose that I must say something, after the great compliment that has been paid me, but which, I assure you, I do not deserve, so much of the credit is due to the Vice-Chairman, Sir Houston Stewart, Sir Alfred Jephson, and the other Honorary Secretaries, also to the Chairmen of the Sub-Committees, and, indeed, everybody working with me, that my portion of the work has been very simple. I think it should be known how very much all of us naval men are indebted to what I may call the lay members of our Committees, gentlemen who are unconnected with the Service, but who have given us invaluable assistance. I allude to Sir George Chubb, Chairman of the Finance Committee; to Mr. Preece, the Electrical Engineer of the Post Office, Chairman of the Electric Lighting Committee; and to many others, amongst them Mr. Laird Clowes, Professor Laughton, and Captain Robinson (the last two being naval men), to whom we are indebted for the valuable historical information in the Catalogues; and Mr. Frank Baden-Powell, whom we have to thank for the diploma, which I am happy to say has given so much satisfaction. I also wish to mention the great services rendered to us by the gentlemen who undertook honorary duties, of Solicitors, Accountant, and Auditor of the Exhibition. The Solicitors, Sir Albert Rollit and Sons, have managed the whole of our law business, and, I believe, if we had had to pay for this, the bill would have amounted to four figures, the first not being a 1. They must have given, I think, something like 2,000*l.* or 3,000*l.* to our charity. The Accountant's work has been done by Mr. Langton, of the firm of Ogden, Palmer, and Langton. Considering Mr. Langton has been dealing with sums amounting to over 150,000*l.*, the work has not been light. The Auditor, Mr. Pennell, of the Admiralty, and who therefore may be said to be one of ourselves, has also had a very heavy task in going through entrances, tickets, &c., to ascertain any errors which may have occurred. The Trinity Board have also given us great assistance. The success of the Exhibition is attributable to the unanimity with which all have worked together during the eighteen months we have been engaged. Of course we have had many differences of opinion, but all difficulties have been

¹ Not intending to speak, and so being unprepared, I omitted to make a remark which I certainly should not have omitted had I considered. It should be placed on record that the work of Rear-Admiral Bowden-Smith, as Chairman of the "Entertainments" Committee, was very different and much more arduous than that of any other Chairman of Committee. To my certain knowledge he was Chairman, Secretary, and Manager to the whole of that Department when it was initiated; and without doubt that most successful and important part of the Exhibition could not have been what it was, but for the untiring devotion and skill of Rear-Admiral Bowden-Smith.

smoothed over, and no ill feeling has ever existed. I feel personally indebted to my colleagues for the pleasant relations which have existed between us.

Captain CURTIS: It appears from what the Admiral has said that he was in this happy position, that he left all the work to his Officers, and had very little to do. That is his modesty, I presume. But any man who remembers the Navy for fifty years must be very thankful when the naval uniform came into vogue. I have been Midshipman and Lieutenant of division for many years, and most difficult it was in the early part to get the men into uniform—generally a year or eighteen months before we could get them into uniform—and there was a great deal of punishment on board ships in consequence. At "Comox," Vancouver, N.P., in 1890, it was a real treat to see the men come ashore. The men came ashore and behaved just as well as they did at the Exhibition. There were two saloons, but I never saw a man drunk, and there were a good many inducements by way of the men being treated. I am sure the public at large have received great benefit from what they have seen in the Exhibition.¹

Sir ALFRED JEPHSON: I should like to say one word with regard to the very complimentary way in which Admiral Colomb has spoken of my services, that is, just to remind you that any little thing I have been able to do has been entirely owing to the consideration shown by all the members of the Committee towards me, and also to the great assistance I received from Lieutenant Maltby and all the Assistant Honorary Secretaries. They all pulled together as one man, and if I might supplement Sir William Dowell's speech, it was not only the Trinity that helped us, but it was the unity.

The CHAIRMAN (Sir Geoffrey Hornby): Having passed fifty-five years in the Service, I may perhaps be allowed one or two words. I wish to say it seems, or it ought to seem, to a great many of you a very curious thing that after a number of naval Officers have brought to a most satisfactory conclusion a very important work, and one in which the whole country, to say nothing of this assembly, is largely interested, yet none of them are to have the smallest credit for what they have done. Well, then, there is only one thing we must fall back upon, and that is that

"There's a sweet little cherub that sits up aloft,"

and that he is particularly looking after "the life of poor Jack." There was another cherub with whom I once had the honour of being associated at the Admiralty. I was engaged on a Committee on which Mr. Bidder, the great engineer and calculating boy, was also sitting, and his opinion, after a long intercourse with us, was that "you naval fellows are the most illogical chaps that ever was in this world." I have pondered over that since, and I have been thinking how it is that these illogical men, these incompetent men as we are all said to be, have somehow or other managed to work the thing out, and that, go where you will or send the Navy where you will, they always pull through. I am sorry to say I have had in my time to send Officers to do a piece of work, and I have felt at the same time, "This is a very unfair business. I have to send this Officer to get right a thing I cannot see either the origin or the outcome of, and all I can say to him is he is to do his best in the interests of the country." I am bound to say I have had to send away many on some such errands, and never have I known of a failure. All I can say is I think we learn in the Service a quality which I can only describe as "adaptability;" that we can suit ourselves to circumstances; that the elements with which we are brought in contact when we are young teach us that we have to deal with circumstances of great importance at a moment's notice, and it excites the faculty very favourably indeed. Now it has been simply carrying out those rules, which you may say begin in the Midshipman's berth and gradually develop in the Navy, that has enabled this Exhibition to have been brought to such a very satisfactory conclusion. I only hope one thing in Sir Alfred Jephson's lecture will be laid to heart here and spread as much as it can be through

¹ I consider the men's general behaviour, language, and conduct a pleasing contrast to that of many of the inhabitants; and no doubt it has had a good effect, as I heard many remarks as to their good conduct.

the country generally, and that is the wish there expressed that this Exhibition should lead all people to see the great necessity there is for keeping the Navy, if it can, efficient for war. To my mind the most striking feature in the Exhibition was that wonderful display of mercantile wealth exhibited in the models, and the thought I could wish to have been brought home more clearly to the visitors than any other was, how it is that all that wealth is to be cared for if we should unfortunately be plunged into war. It is one of those topics which everybody in England ought to lay to heart, and to try to improve, and to bring home to the people. The question is a very serious one how seamen are to be educated, since we have done away with compulsory apprenticeship, and how they are to be dealt with to protect all that enormous marine. I am very glad indeed to think that the men of the Navy have been seen here in London, and seen in a way that shows how good the education of the seamen is in the Royal Navy. Nothing can be better, in my humble opinion. If the mercantile marine of the country is to be defended as it ought to be, we have simply to do what we see, and what we are supposed to think is a heavy burden, laid upon foreign nations, that is, to see that the Navy shall devote itself to bringing up a class of seamen, and not only seamen, but men who are accustomed to discipline and to the discharge of duty, so that if war comes on, all these men may be ready to rejoin their old Service, and carry the country through the war as the country has been carried through war before. If we do not, it is impossible that the sea can be commanded as our forefathers commanded it.

Sir WILLIAM DOWELL: Before we part I should like to propose a vote of thanks to Sir Geoffrey Hornby for having been so good as to come up to-day and give us his assistance. As Admiral Colomb said, we wish we could oftener see him here, but as he so seldom comes, I think we are the more indebted to him for having come on this occasion.

Sir VESEY HAMILTON: I beg to second that. I am sure not only all present, but everybody who will read the statesmanlike speech made by Sir Geoffrey Hornby, will profit by it. [The resolution was carried by acclamation.]

The CHAIRMAN: I am very much obliged for the kind way in which reference has been made to me. There is one other matter of duty which I have to ask you to authorize me to perform, and that is one that I am sure will be very agreeable to you, viz., to return to the lecturers your best thanks for the very able discourses which they have given to us, affording, as they have done, a great amount of instruction. The Naval Exhibition is largely indebted to them; they have wound it up in the most complete manner by the exposition they have given of what was done.

Sir ALFRED JEPHSON: I wish to thank you for the vote of thanks you have given us, and also to express the great satisfaction I feel that you, Sir, as my old Chief, have presided on this occasion.

NAMES OF MEMBERS who joined the Institution between the 1st January
and the 31st March, 1892.

LIFE MEMBERS.

Russell, W., Capt. R.E.
McLeod, D. J. S., D.S.O., Lt.-Col. Ind.
Army.
Rycroft, W. H., Capt. 7th Drag. Gds.
Bell, James A., Staff Paymr. R.N.
Harrison, W., Major 3rd Bn. L.N. Lan.
Regt.
St. John, O. B., Capt. late 58th Regt.
Kershaw, F., Capt. 2nd Bn. York and
Lanc. Regt.

Grubb, A. H. W., Lieut. R.E.
Lambton, Hon. W., Lieut. C. s.
Bevington, S. N., Lieut. The Queen's
(Rl. W. Surrey Regt.).
Sackville-West, C. J., Lieut. King's R.
Rifle Corps.
Drummond, K. M., Capt. Leinst. Regt.
May, William B., Lieut. R.N.

ANNUAL SUBSCRIBERS.

Morant, A. L., Lieut. Hon. Arty. Com-
pany.
Hobart, C. V. S., Lieut. Gren. Gds.
Alexander, A. H., Major Brit. Guiana
Vol. Militia.
Egerton, C. P., Lieut.-Col. Dorset Regt.
Briggs, W. E., Major Hamp. Regt.
Guinness, E., Capt. R.A.
Hore-Ruthven, Hon. W. P., Lieut. Sco.
Gds.
Murray, J. W., Major R.A.
Manifold, J. F., Capt. R.A.
Myth, R. N., Lieut. 21st Hussars.
Crake, W. H., Capt. 7th Bn. Rifle Bde.
Attiscombe, C., Lieut. R.A.
Donnell, H., Capt. W. Yorks Regt.
Gan, F. C. L., Lieut. L.N. Lan. Regt.
mb, C. A., Capt. Rifle Bde.
owe, E. A., Lieut. 1st V.B. R. Fus.
pper, C. Abercrombie, Lieut.-Col. late
Pemb. Arty. (W. Div. R.A.).
McMunn, G. F., Lieut. R.A.
ckworth, Sir A. W., Bart., Col. R.E.

Robb, David, Ch. Engr., Inspector of
Machinery (retd.) R.N.
Jones, T., Lieut. R.A.
Campbell, J. C., Capt. R.E.
Chancellor, J. R., Lieut. R.E.
Wardrop, J. C., Lieut. Fife Lt. Horse
Vols.
Brunner, F. W., Lieut. R.E.
Cherry, H. A., Major Northd. Fus.
Ducrôt, L. H., Capt. R.A.
Maguire, T. M., Lieut. 14th Middx. Rifle
Vols.
Farrant, R. K., Lieut. R.A.
Tyrrell, G. E., Lieut. R.A.
May, W. S. R., Lieut. 1st Bn. E. Yorks
Regt.
Loch, H. F., Capt. Ind. S. Corps.
Everett, Allan F., Lieut. R.N.
Vickers, C., Lieut. R.W. Sur. Regt.
Shewell, H. W. M., Capt. R.A.
Awdry, H., Lieut. 1st V.B. R. Bucks
Regt.

FOREIGN SECTION.

THIS portion of the Number, hitherto the Occasional Notes, has now become the Foreign Section, and is reserved for articles, either original or compiled, on professional subjects connected with Foreign Naval and Military matters; also for notices of Professional Books, either Foreign or English.

The Council of the Institution wish that this section shall be developed still further, and I have undertaken to continue my Editorship during the current year, with a view of aiding them in carrying out this work. It seems to me possible to make this section, and consequently the Journal, the means of keeping our Members acquainted with all naval and military progress abroad *pari passu* with that progress; and I shall be glad to receive from members of both Services, including in the latter those of the Auxiliary Forces, suggestions, information, or offers of assistance.

It is desirable, further, that I should state that, as regards editing the Naval matter in the Section, I shall have the aid of Naval Officers, thoroughly competent to give good advice and to pronounce sound opinions.

It must, however, be borne in mind that, as the change from a quarterly to a monthly issue has been made in order to ensure the more prompt publication of the Lectures after their delivery than has hitherto been the case, the Foreign Section will, as a rule, be restricted in extent during the Lecture season in the first half of the year, and will be prominent in the second half.

It is requested that communications and books for review (the latter under cover to the Librarian) may be addressed to me at the Royal United Service Institution, Whitehall Yard, London, S.W.

LONSDALE HALE,

Colonel R.E. ret.

THE DEFENSIVE STRENGTH OF RUSSIA.¹

Compiled by Major MAURICE RECH, Imperial and Royal Austro-Hungarian Army. Translated by Major C. E. DE LA POER BERESFORD, Wilts Regiment.

General Officers on Service at St. Petersburg.

War Minister: General (of infantry) Wannovski.

Adlatus and Private Secretary: General (of infantry) Durnovo.
Chief of the General Staff: General (of infantry) Obrutsheff.

Adlatus: Lieutenant-General Welitschko.

Inspector-General of the Artillery: H.I.H. Grand Duke Michael (Field Marshal).

Inspector-General of the Cossacks (Ataman): H.I.H. Grand Duke Nicholas Alexandrovitch (Czarewitch).

Director of Technical Administration: Major-General Saboltkin.

Inspector-General of Rifle Battalions: General (of infantry) von Nothbeck.

Inspector-General of Cavalry: H.I.H. Grand Duke Michael (Field Marshal).

Governors-General of the most important Governments.

Warsaw: General (of cavalry) von Gourko, also Commander-in-Chief of the Troops, and, in case of war, Presumptive Chief of the Forces in Russian Poland.

Moscow: H.I.H. Major-General Grand Duke Sergius.

Kieff: General (of infantry) Ignatieff.

Caucasus: General (of cavalry) Scheremetieff, also Commander-in-Chief of the Troops.

Military District Commanders (the most important).

St. Petersburg: H.I.H. Lieutenant-General Grand Duke Vladimir.

Warsaw: General (of cavalry) von Gourko.

Wilna: General (of infantry) Panetski II.

Kieff: General (of infantry) von Dragomiroff.

Moscow: General (of artillery) Kostanda.

¹ From the "Militär Zeitung," February 21, 1892.

Army Corps Commanders.

Guard Corps	St. Petersburg : Gen. (cav.) von Manse.
Grenadier Corps	Moscow : Lieut.-Gen. Malachòff.
1st Army Corps	St. Petersburg : Lieut.-Gen. Danilòff.
2nd „ „	Wilna : Gen. (cav.) Baron Driesen.
3rd „ „	Riga : Gen. (inf.) Alchasòff.
4th „ „	Minsk : Gen. (inf.) Petruschèvski.
5th „ „	Warsaw : Gen. (art.) Sviestunòff.
6th „ „	Warsaw : Gen. (inf.) Kulgatschèff.
7th „ „	Sevastopol : Lieut.-Gen. Janòvski,
8th „ „	Odessa : Gen. (of engineers) Röhrberg.
9th „ „	Kieff : Lieut.-Gen. Óvander.
10th „ „	Charkoff : Lieut.-Gen. Winberg.
11th „ „	Zitomir : Lieut.-Gen. Prince Schachòvskoje.
12th „ „	Uman : Lieut.-Gen. Sverjeff.
13th „ „	Moscow : Lieut.-Gen. Igelström.
14th „ „	Lublin : Lieut.-Gen. Krschivòblotski.
15th „ „	Warsaw : Lieut.-Gen. Mirkovìtsch.
16th „ „	Vitebsk : Lieut.-Gen. Richter.
17th „ „	N. Novgorod : Lieut.-Gen. Saljesoff.
Caucasus Army Corps	Tiflis : Lieut.-Gen. Count Tschavtschavadse.
Finland	{ Commander-in-Chief, Gen. (inf.) Count Heyden. Chief of the Staff, Maj.-Gen. Kaulbars.

Inspectors-General of Fortresses.

Group I: Lieutenant-General Anossoff; including the fortresses Bobruisk, Brest-Litovski, Düna-burg, Dünamünde, Gonionds, Ivan-gorod, Kars, Kertsch, and Petshersk in Kieff.

Group II: Lieutenant-General Pavloff; including the fortresses Korno, Kronstadt, Michaelòvo, Novo-Georgievsk, Odessa, Ossowez, Otschakov, Poti, St. Petersburg (St. Peter and St. Paul Fort), Sc-vastopol, Sveaborg, Wyborg.

Group III: Major-General Stepanoff. The fortified places Achal-zich, Alexandropol, Ardahan, Batoum, Bender.

DISTRIBUTION OF TROOPS.

1st Military District, St. Petersburg.

Commander, H.I.H. Grand Duke Vladimir, &c.

Guard Corps, consisting of—

1st Guard Cavalry Division (2 Guard Don Cossack regiments, 1 Ural Cossack sotnia, 4 Guard Cuirassier regiments), together 25 squadrons, of which 9 now in Warsaw.

2nd Guard Cavalry Division (7 regiments in 3 brigades), 42 squad-rons.

Guard Rifle Brigade.

1st and 2nd Guard Infantry Divisions.

1st and 2nd Guard Artillery Brigades.

All the above, with the exception of 9 squadrons in Warsaw, in St. Petersburg.

1st Army Corps, St. Petersburg District :—

1 cavalry division at Twer. 4 sotnias of Kuban and Terek Cossacks, of which 2 sotnias at Gatschina as escort to the Emperor.

37th Infantry Division and the Guard Horse Artillery Brigade (St. Petersburg). 22nd Infantry Division, 22nd and 37th Artillery Brigades and 1st Reserve Artillery Brigade (Novgorod). 23rd Infantry Division and 23rd Artillery Brigade at Reval and Gatschina. 1st Sapper (Engineer) Brigade, and 11 infantry reserve battalions. St. Petersburg: together numbering

95 battalions,
62 squadrons,
6 horse artillery batteries,
36 field artillery batteries.

IIInd Military District, Finland.

Commander, General Adjutant and Infantry General Count Heyden, &c.

19th Don Cossack Regiment, Abo.

24th Infantry Division

24th Artillery Brigade

4 cadre infantry battalions

} Helsingfors.

9 rifle battalions: together numbering

29 battalions,
6 squadrons,
6 batteries.

IIIrd Military District, Wilna.

Commander, General (of infantry) von Ganetzki.

2nd Army Corps, Wilna: consisting of the 2nd Cavalry Division (Suwalki) at present in Wilna; 26th Infantry Division and 26th Artillery Brigade (Grodno); 27th Infantry Division and 27th Artillery Brigade (Wilna). 28th Infantry Division (Dünaburg) belongs now to the 3rd Army Corps (Riga). 28th Artillery Brigade (Witebsk) belongs now to the 3rd Army Corps (Riga).

3rd Army Corps (Riga): consisting of the 3rd Cavalry Division and 25th Infantry Division (Kovno), belongs now to the newly formed 16th Army Corps. 29th Infantry Division and 29th Artillery Brigade in Riga. 25th Artillery Brigade in Wilkomir, belongs now to the newly-formed 16th Army Corps.

4th Army Corps (Minsk): consisting of the 4th Cavalry Division in Bijalistock, 5th Rifle Brigade (Wilna), transferred to Suwalki. 30th, 41st (belongs now to the 16th Army Corps), and 47th Reserve Infantry Divisions, 30th and 41st (now in 16th Army Corps) Artillery Brigade (Minsk). 16th Infantry Division (Mogileff), transferred to Bijalistock and Wolkovski. 45th Reserve Infantry Division (Dünaburg). 46th Reserve Infantry Division (Wilna). 16th Artillery Brigade (Gomely), transferred to Bijalistock and Wolkovski. 2nd Engineers and Railway Brigade (Riga), transferred to Wilna.

16th Army Corps (Witebsk): consisting of 25th Infantry Division and 25th Artillery Brigade (Dünaburg). 41st Infantry Division (Mogileff). 41st Artillery Brigade (Gomel).

This is a newly-formed Army Corps.

Strength of the whole military district, Wilna, in 1891:—

70 squadrons,
156 battalions,
56 batteries.

IVth Military District, Warsaw.

Commander: General (of cavalry) von Gourko.

3rd Guard, Cavalry Brigade, Warsaw.

3rd Guard, Infantry Division, Warsaw.

3rd Guard, Artillery Brigade, Warsaw.

5th Army Corps (Warsaw): consisting of the 5th Cavalry Division (in Wloclavsk), 7th Infantry Division, 7th Artillery Brigade (Radom), 10th Infantry Division (Warsaw), 10th Artillery Brigade (Lodicz).

6th Army Corps (Warsaw): consists of the Kuban Cossack Division of Warsaw. 6th Cavalry Division, 4th Infantry Division (Lomza). 6th Infantry Division (Plock). 8th Infantry Division, Warsaw (belongs since 1889 to the 15th Army Corps). 4th Artillery Brigade (Ostrog). 6th Artillery Division (Pultusk), transferred to Warsaw in 1889. 8th Artillery Brigade (Lodz), transferred to the 15th Army Corps in 1889.

14th Army Corps (Lublin): consisting of the 14th Cavalry Division (Censtochau), transferred to Kielze in 1889. Don Cossack Cavalry Division (Zamosk), belongs to 15th Army Corps since 1889. 1st Rifle Brigade at Wloclavsk. 2nd Rifle Brigade (Censtochau). 17th Infantry Division (Siedlec), transferred to Lublin and Wlodova in 1889. 18th Infantry Division (Lublin). 17th Artillery Brigade (Bjela), transferred to Lublin and Wlodova. 18th Artillery Brigade (Lublin). 4th Engineer Brigade (Warsaw). 16 reserve infantry cadre battalions, which in case of war would form

The 48th Infantry Division at Warsaw,

49th	„	„	Novo-Georgievsk,
50th	„	„	Lublin, and
51st	„	„	Brest-Litovski.

15th Army Corps, Warsaw: lately formed from parts of the old 15th Corps (Kazan district) and the 6th Corps, consisting of—

The Don Cossack Division, Samostje.
 13th Army Cavalry Division, Lublin.
 2nd Infantry Troop Division, Brest-Litovski.
 2nd Artillery Brigade, Bjela.
 8th Infantry Troop Division, Warsaw.
 8th Artillery Brigade, Lowitsch.

Grand total of the IVth Warsaw Military District; including the changes above noted, which constitute a reinforcement, since 1888, of 30 battalions, 278 squadrons, and 5 batteries:—

176 battalions.
 6 technical battalions.
 134 squadrons.
 60 batteries.

Vth Military District, Kieff.

Commander: General-Adjutant and General (of infantry)
 Radetzki.

9th Army Corps, Kieff. This corps has been lately formed from parts of the 9th Corps (Orel) and the 12th Corps, and moved to Kieff; it now consists of—

The 9th Army Cavalry Division, Romni.
 5th Army Infantry Division, Tschernigoff.
 5th Army Artillery Brigade, Nieschin.
 33rd Army Infantry Division, Kieff.
 33rd Army Artillery Brigade, Kieff.
 3rd Engineer Brigade, Kieff.
 4 reserve battalions (forming 55th Reserve Division), Kursk.

10th Army Corps, Kharkoff. This corps has been lately formed from the old 10th Corps, and transferred to the Kieff Military District; it consists of—

The 10th Army Cavalry Division, Kharkoff.
 9th Army Infantry Division, Poltawa.
 9th Army Artillery Brigade, Poltawa.
 31st Infantry Division, Kharkoff.
 31st Artillery Brigade, Bielgorod.
 4 reserve battalions to form 54th Reserve Division.

11th Army Corps, Zitomir, consisting of—

The 11th Cavalry Division, Dobno.
 11th Infantry Division, Luck.
 32nd Infantry Division, Zitomir.
 11th Artillery Brigade, Rovno.
 32nd Artillery Brigade, Berditscheff.

12th Army Corps, Kieff, consists of—

The 12th Cavalry Division, Staff in Kieff, now in Winniza; the 4 regiments of this Cavalry Division were moved so far back as 1888 to the Austrian frontier, between Troskuroff and Kameniec-Podolsk.

The 3rd Rifle Brigade, Tulcin.

12th Infantry Division, Miczibuzie.

19th Infantry Division, Uman.

8 reserve infantry cadre battalions, to form in war-time, the 52nd Infantry Division at Kieff, and the 53rd Infantry Division at Winniza.

The 12th Artillery Brigade, Winniza.

19th Artillery Brigade, Smiela.

3rd Engineer Brigade, Kieff.

Thus, the grand total of the Kieff Military District, which in 1888 was 76 battalions, 48 squadrons, and 4 horse and 24 field batteries, is now, 1891-92,

156 battalions,
70 squadrons,
63 batteries;

or has been nearly doubled.

Vith Military District, Odessa.

7th Army Corps, Sevastopol, consists of—

The 7th Cavalry Division, Elizabethgrad.

13th Infantry Division, Sinferopol.

34th Infantry Division, Ekaterinoslav.

13th Artillery Brigade, Sevastopol.

34th Artillery Brigade, Kherson.

8th Army Corps, Odessa, formed of—

The 8th Cavalry Division, Kischeneff.

4th Rifle Brigade, Taganrog.

14th Infantry Division, Kischeneff.

15th ,, ,, Odessa.

Twelve infantry reserve cadre battalions, forming, in case of war four reserve divisions:—

The 50th Infantry Division, Odessa.

61st ,, ,, Nicholaieff.

62nd ,, ,, Sevastopol.

14th Artillery Brigade, Kischeneff.

15th ,, ,, Wosnosensk.

5th Reserve Artillery Brigade, Taganrog.

5th Engineer Brigade, Odessa.

Grand total Military District, Odessa—

86 battalions.
48 squadrons.
4 H.A. batteries.
30 field batteries.

VIIIth Military District, Kharkoff.

Broken up in 1889, and partially incorporated in the Vth, or Kieff Military District.

9th Army Corps, Orel, consisted of—

The 9th Cavalry Division, Romni.
5th Infantry Division, Cernizoff.
36th " " Orel.
5th Artillery Brigade, Nieschin.
36th " " Mcensk.

10th Army Corps, Kharkoff, consisted of—

The 10th Cavalry Division, Kugnieff.
9th Infantry Division, Poltawa.
31st " " Kharkoff.
9th Artillery Brigade, Poltawa.
31st " " Bielgorod.
4th Reserve Artillery Brigade, Kursk.

Twelve infantry and reserve cadre battalions, forming, in case of war, the 57th, 58th, 59th Infantry Divisions, Charkoff, Kursk, Orel, respectively.

Grand total since the transfers and reduction of 1888:—

76 battalions.
48 squadrons.
4 H.A. batteries.
30 field batteries.

N.B.—Thus it will be seen that the increase in the Vth Military District, Kieff, has been chiefly carried out at the expense of the VIIIth Military District, Kharkoff.—[TRANSLATOR.]

VIIIth Military District, Moscow.

Commander H.I.H. Grand Duke Sergius, &c.

Grenadier Corps at Moscow, consists of—

The 1st Grenadier Division, Moscow.
2nd " " Kaluga, now in Moscow.
3rd " " Tambov, now in Moscow.

1st Artillery Brigade, Moscow.
 2nd " " Kaluga.
 3rd " " Rijazan.
 1st Cavalry Division, Moscow.

13th Army Corps, Moscow, consisting of—

The 13th Cavalry Division, Rijazan, now in Lublin with 15th Corps.
 1st Infantry Division, Moscow.
 3rd " " N. Novgorod, sent to 17th Corps.
 35th " " Jaroslav, sent to 17th Corps.
 1st Artillery Brigade, Moscow, now at Wiasma.
 3rd " " Paulovski, sent to 17th Corps.
 35th " " Rostov, sent to 17th Corps.
 3rd Reserve Artillery Brigade, Smolensk.
 2nd " " " Serpuchoff.

Twenty infantry reserve cadre battalions, forming, in case of war, the following reserve divisions, viz. :—

56th Division, Moscow; 57th Division, Vladimir; and the 58th Division, Orel.

17th Army Corps, Nishni-Novgorod, newly formed, commanded by Lieutenant-General Saljesoff, consists of—

The 3rd Infantry Division, N. Novgorod.
 35th " " Jaroslav.
 3rd Artillery Brigade, Paulovsk.
 35th " " Rostoff.

Four reserve cadre battalions, forming, in war time, the 59th Reserve Division, Jaroslav.

N.B.—This army corps is nearly entirely formed of transfers from the 13th Moscow Army Corps.

Grand total VIIIth Military District, Moscow, in 1891 :—

132 battalions.
 24 squadrons.
 56 batteries.

IXth Military District, Kazan.

Commander, General-Adjutant, and General (of infantry)
 Meschtschérinoff.

15th Army Corps, Kazan, formed in 1888, but now mostly transferred to the IVth Military District, Warsaw, consists of—

The Astrakhan Cossack Cavalry Regiment, Kazan, now in Astrakhan.

Sixteen sotnias Orenburg Cossacks with two horse artillery Cossack batteries, Orenburg.

63rd Infantry Division,	Kazan.
64th " "	Penza.
65th " "	Ssamara, besides the six local battalions at Kazan and Orenburg.

Grand total IXth Military District, Kazan :—

50 battalions.
20 Cossack sotnias.
2 horse artillery batteries.
12 field " "

Xth Military District, Province of the Don.

Ataman, Lieutenant-General Prince Swiàtopolsk-Mirski.

The 12th Don Cossack Cavalry Regiment at and about Novo-Cerkask, which is at present the seat of the Don Cossack administration.

XIth Military District, Caucasus.

Commander: General-Adjutant and General (of cavalry) Dondokòff-Korsakoff.

1st Caucasian Army Corps, Tiflis, consists of—

The 1st Caucasus Cossack Cavalry Division,	Tiflis.
2nd " " " "	Elisabethpol.
Caucasus Grenadier Divisions,	Tiflis.
38th Infantry Division,	Achalzich, now in Kutais.
39th " " "	Alexandropol.
Caucasus Grenadier Artillery Brigade,	Tiflis.
38th Artillery Brigade,	Achalzich.
39th " " "	Kars.

2nd Caucasian Army Corps, Tiflis, consists of—

The 3rd Caucasian Cavalry Division,	Helenendorf, now in Tiflis.
Kuban Cossack Cavalry Brigade,	Ekaterinodat.
Terek " " "	Vladikavkas.
Caucasus Rifle Brigade,	Tiflis.
19th Infantry Division,	Stàvropol, transferred to 12th Corps, Uman.
20th " " "	Vladikavkas.
21st " " "	Petrovsk, now in Temir-Khan.
19th Artillery Brigade,	Stàvropol, transferred to the 12th Corps, Uman and Smiela.
20th " " "	Vladikavkas.
21st " " "	Temir-han-Schura.

2nd Infantry Division, Kazan.

40th „ „ Ssaratoff.

Twelve infantry reserve cadre battalions to form, in case of war, the—

Kuban Artillery Brigade, Ekaterinodat.

Caucasus Engineer Brigade, Tiflis.

2 Cossack rifle battalions and 18 reserve battalions.

Grand total of the XIth Military District, Caucasus :—

Grand total, 1888 :—

120 battalions,
102 squadrons,
6 H.A. } batteries,
40 field }

and in 1891, after the reinforcement of the Vth Military District, Kieff, from the Caucasus :

100 battalions,
90 squadrons,
42 batteries.

Fortress Artillery for the whole Empire.

This force especially told off for the attack and defence of fortresses is thus distributed divided into battalions :

6	battalions in	Kronstadt.
6	„	„ Modlin.
2	„	„ Sveaborg.
2	„	„ Wyborg.
1	„	„ Dünamünde.
4	„	„ Dünaburg (siege train).
4	„	„ Brest-Litovski (siege train).
4	„	„ Ivangorod (siege train).
3	„	„ Kieff.
2	„	„ Ostchakoff.
1	„	„ Bobruisk.
3	„	„ Warsaw.
1	„	„ Bender.
3	„	„ Kertsch.
1	„	„ Kars.
1	„	„ Batoum.
1	„	„ Alexandropol.
1	„	„ Daghestan.
1	„	„ Poti.
1	„	„ Michaelovsk.

Total 48 battalions.

XIIth Military District, Turkestan.

Its establishment consists of—

46 Cossack Cavalry Sotnias: of these, however, 18 squadrons were sent to Europe in 1889, so there remain—

28 Sotnias Cossack Cavalry.

3 Brigades of Rifles, at Askabad and Merv.

20 Line Battalions, for Tashkend, Samarkand, and Kerki.

3 Local Battalions.

$\frac{1}{2}$ Engineer Battalion.

2 Railway Battalions, Tashkend, now at Kezil-Arvat and Samarkand.

2 Horse Artillery } Batteries.

1 Mountain

1 Turkestan Artillery Brigade.

Grand total:

32 battalions (the establishment being $34\frac{1}{2}$).

28 (of an establishment of 46) sotnias.

3 H.A. batteries.

10 field batteries.

N.B. From this district 18 squadrons and $2\frac{1}{2}$ battalions have been directed westwards.—[TRANSLATOR.]

SIBERIA.

XIIIth Military District, West Siberia.

16 Cossack Sotnias of Cavalry in Dscharkend and Wierni.

8 Line Battalions.

3 Local Battalions.

1 Company Engineers.

1 Mountain Mounted Battery.

1 West Siberian Artillery Brigade.

Total:

$11\frac{1}{4}$ battalions.

16 sotnias of cavalry.

4 field

1 mountain } batteries.

XIVth and XVth. Military Districts, Irkutsk and Amur.

9 Cossack sotnias of cavalry.

2 Brigades of Rifles (transferred to Europe in 1889).

2 Cossack infantry battalions.

6 infantry battalions.

2 sotnias Amur infantry.

- 6 infantry reserve cadre battalions.
- 1 East Siberian Artillery Brigade of 4 batteries.
- 2 Cossack H.A. batteries.
- 1 Company Engineers.

Total 12 battalions (the Rifles deducted).

9 sotnias, cavalry.

6 batteries.

Summary.—The whole length of the German and Austrian frontiers, from Libau to Kameniec-Podolsk, is watched by a continuous chain of Russian Cavalry Corps, belonging to the centres—Warsaw, Wilna, Kieff, which shelter Moscow and Odessa. Thus the enormous force of seventeen Russian Army Corps is grouped in a space more than twice as large as our whole Fatherland (Austria-Hungary).

There are now in the Military District of Wilna *four* Army Corps, as against *three* in the spring of 1888. In the Warsaw District, a portion of the Guard Corps, and behind this, four more Army Corps; so that the available force in this district is stronger by:

24 battalions,
27 squadrons, and
4 batteries,

than it was in 1888.

The reinforcement of the Vth Military District, Kieff, is most striking: until 1888 there were only 2 corps in it; now the VIIth Military District, Kharkoff, is incorporated with it, and 20 battalions and 12 squadrons have been transferred to it from the Caucasus; so that now the Kieff District comprises 4 Army Corps, which constitutes a reinforcement here alone of:

80 battalions,
22 squadrons, and
35 batteries.

The Military District of Moscow receives a new corps, and now numbers 24 battalions and 4 batteries more than in 1888; whilst 24 squadrons have been sent from it westwards.

From these statements it can be understood that the tendency of the Russian War Ministry since 1888 has been to bring successive bodies of troops from the eastern provinces, so as to strengthen very considerably the military districts which lie near the German and Austrian frontiers.

THE NAVAL SCHOOLS OF THE CHIEF CONTINENTAL POWERS. PART IV.

(Continued from No. 170.)

Compiled by Major W. TENISON, the Manchester Regiment, from papers in the "Rivista Marittima," by 1st Class Commissary DANTE PARENTI.

Spain (continued).

The routine of the School is as follows:—

5.30 to 6	Réveille.
6 to 7.30	Studies.
7.30 to 8	Preparation for inspection.
8 to 8.15	Inspection.
8.15 to 10	Lectures.
10	Lunch.
11 to 12.30	Lectures.
12.30 to 2	Studies.
2 to 4	Lectures and exercises.
4 to 7	According to station, recreation and dinner.
7 to 9.15	Studies.
9.15	Slinging hammocks.
9.30	Lights out.

A month previous to the examinations, extra voluntary study is permitted for an hour or two after lights out.

On Feast days, studies last only for an hour in the morning and two hours in the evening. On these days the students may receive visits from their parents within the limits established by the Commandant. In case of illness, the Commandant may authorize the visits of parents on any day of the week. On Sundays and holy days the students are allowed to land and visit their parents. They are accompanied by an Officer to a certain spot, where they must reassemble before returning on board ship. Those students who have a father or mother, or some friend duly recognized by their family, living in the town, may, on the first Sunday in each month, obtain leave for the whole day. This privilege is also conceded, so far only as father or mother is concerned, to deserving students on holy days.

Board of Administration.—This is composed of

The Director as President.

The Sub-Director.

One Professor.

Three Professors selected by the Director.

One Professor (junior) as Secretary.

Its duties are :—

(a.) To keep the studies up to the standard of the most modern changes and progress in those sciences and arts relating especially to naval organization.

(b.) To submit any change in the programme of examination which may be deemed expedient.

(c.) To make a report, and give an opinion, on all scientific conferences which take place at the School.

(d.) To determine the limits of instruction, both theoretical and practical, to be given in the classes.

(e.) To select the works, the instruments, the models, &c., to be acquired for the instruction of the students, for the library, and for the chemical, physical, and meteorological laboratories.

The Board assembles at the discretion of the President.

All questions are decided by majority of votes, but any individual member may have his opinion recorded.

The Studies.—The whole course is divided into five courses of six months each, commencing on the 1st of January and 1st of July in each year. The subjects of instruction are arranged on a progressive scale, culminating in the class for Navigation and Hydrography, Artillery, Nautical Meteorology, Manœuvring, and Fencing.

Those students, who by reason of a special examination are permitted to join the second or third course immediately on admission, must, at the disposition of the Commandant, be instructed during extra hours, and without prejudice to their other studies, in those military and naval exercises which are taught in the 1st class.

The students are exercised in naval telegraphy and the practical management of engines, and those in the last course are transferred to cruisers placed at the disposal of the School.

Half-yearly Examinations.—These take place at the end of each half-year, and are conducted by a Board composed of the Director, Sub-Director, Third in Command, and all the Professors. This Board can be subdivided into two when the number of students exceeds fifty, and into three when it exceeds ninety.

Previously to the half-yearly examination, each Professor classifies the students in two lists according to their proficiency, and forwards these lists to the Director. The results of the examinations in Mechanics, Physics, Astronomy, Navigation, Engines, and Artillery are determined by marks as follows :—

3, unsatisfactory; 4—6, satisfactory; 7—9, good; 10—12, very good; 13, excellent.

The members of the Board record their votes twice; the first time as to the fitness, or otherwise, of the candidate (these are kept secret); the second time as to the order of merit of the candidate. This is expressed in marks. Each member of the Board, commencing with the junior, records his opinion by marks as above, thirteen being the maximum. In practical studies, such as Gymnastics, Fencing, and Naval and Military exercises, the marks are good, very good, or satisfactory.

Any student failing in the half-yearly examination may repeat the

six months' course, but if he fails a second time is liable to dismissal from the School. All students, who have not obtained the mark "satisfactory" in practical studies, are punished by being placed under arrest till the commencement of the next course. Those who fail at the final examination undergo thirty days' arrest, beginning on the first day of embarkation.

A candidate, who is unable to go through the examination at the same time as the others on account of illness, may do so as soon as well enough. If a student is absent for thirty days from lectures in any one subject through illness, he may be excused from examination in it, provided he presents himself for examination within the first fifteen days of the succeeding course. If for sixty days, he may be excused from examination, and repeat the course; in case of failure, however, to pass at the end of the repeated course, it will not prevent him from repeating the course once more.

The students after passing successfully the examination at the end of the last course obtain forty days' leave. Leave is also granted to all who have passed the half-yearly examinations for the time between the end of one and the beginning of the next course.

Prizes and Penalties.—Application and progress in study, apart from receiving its own reward in the consideration of the authorities and in seniority, is rewarded at the end of the course by a silver medal with blue ribbon, inscribed on one side "Prize for application," and on the other "Naval School." To this medal, which may be won at every half-yearly examination, and therefore worn during the entire sojourn at the School, is added a bar bearing the names of the subjects in which the recipient may have obtained full marks.

Punishments awarded are of two classes: light or severe. The first are awarded for slight irregularities committed without deliberate intent, through apathy, thoughtlessness, or inadvertence.

The latter for want of respect or obedience to superiors; irregularities in dress, and disorderly conduct out of the School.

The former consist of:—

1. Private admonition.
2. Punishment drill or extra guard during hours of recreation.
3. Stoppage of leave of absence for one or more holy days.
4. Imprisonment for less than twenty-four hours.

The latter are:—

5. Public reprimand before the whole class.
6. Imprisonment from one to eight days.
7. Stoppage of leave for one, two, or three months, or for the whole course.
8. Stoppage of vacations.
9. Solemn reprimand by the Director before all the classes.
10. Repetition of a six months' course.
11. Expulsion.

These may only be inflicted by the Council of Discipline, consisting of the Director as President, the Second in Command, the Third in Command, and the senior Officers. Awards by the Council of Dis-

cipline are carried out at once, with the exception of Expulsion, which must be confirmed by the Minister.

The lighter punishments may be awarded by the Officers, who, however, must report the case to the Director.

Expulsion may be carried out in two ways:—

First, after the approval of the Minister, by informing the father or guardian of the pupil, who is then allowed to send in a voluntary resignation. Secondly, the pupil may be summarily expelled; a notification being at the same time sent to the parents of the reason for so severe a measure.

The Council of Administration is composed of the Commandant as President, the Second and Third in Command, the next Senior Officer, and the Paymaster, who acts also as Secretary. They have charge of all expenses and accounts. The lesser and current expenses approved by the Council are ordered by the Commandant. All extraordinary expenses are submitted to the Inspector.

The library is under the control of an Officer, nominated by the Commandant. Pupils may obtain books therefrom every Thursday and Sunday, but must make good all losses and damage.

The Academy for Higher Studies, at the Astronomical Observatory of S. Fernando at Cadiz, is under the direction of a Captain, with a Senior Naval Engineer Officer as Sub-Director. The Professors consist of four or five Naval Lieutenants, three Naval Engineer Officers, two Artillery Officers, and various civilians.

Naval Sub-Lieutenants, with not less than three years' service, and Naval Lieutenants, are admitted, if they have proved themselves fit; that is if they have obtained in their examinations the classification, excellent or very good. The course lasts four years, and includes Higher Algebra, Analytical and Descriptive Geometry, Chemistry, Calculus, Mechanics, Practical Astronomy, Physics, Land Surveying, French, English, and German.

Other Schools.

School of Naval Engineering.—At the arsenal of Ferrol, admission is by competitive examination. The course lasts three years. Age of candidates must be between eighteen and twenty-six. On passing successfully the final examination candidates become 2nd Class Engineers with the rank of Lieutenant.

Academy of Naval Artillery, at San Carlo, Cadiz. Under the direction of a Colonel of Artillery, with a Lieutenant-Colonel as Sub-Director. The conditions of admission are—

Competitive examination.

Age between sixteen and twenty-one.

Aptitude for military profession.

The pupils are divided into three classes—

a. Those who go through a six months' preparatory course without pay.

b. Those in their second or third year who receive the pay of Midshipmen of 1st Class.

c. Officers.

At the end of their studies they obtain the rank of Lieutenant of Artillery.

General Academy for Marine Infantry.—For the training of Marine Officers, non-commissioned officers, and corporals.

Age of admission, eight to fourteen. All remain in the School till the age of eighteen. Pupils, on reaching the age of sixteen, if they prove themselves unfit for the rank of Officer, are enrolled as corporals in the corps of Marine Infantry, in which they have to serve for eight years, in compensation for the education they have received. The number of pupils is 100, for the most part sons of Officers who have died in the Service.

School for Corporals and Gunners.

School for Seamen.

Torpedo School.

School of Naval Administration.

Italy.

The Royal Naval Academy was founded at S. Jacopo, near Leghorn, towards the end of 1881, on the suppression of the Naval Schools of Genoa and Naples, which were inaugurated in 1817. It is under the direct authority of the Minister of Marine, who appoints an Admiral as Commandant of the School, assisted by a Post-Captain or Captain as Second in Command, and Director of Studies. The course lasts five years, and is divided into five classes, each of one year.

The Staff, in addition to the Commandant and Second in Command, consists of—

A Commander, in command of the companies.

A Lieutenant as Secretary.

Five Lieutenants, as Company Commanders.

Five Sub-Lieutenants, as Subaltern Company Officers.

Two Administrative Officers, the one acting as Secretary to the Council of Administration, the other as Paymaster and Purser.

A Religious Instructor.

Two Sanitary Officers.

The Military Educational Staff consists of—

A Naval Staff Officer for Hydrography, Astronomy, and Navigation.

A Staff Officer for Artillery.

A Naval Engineer Officer for Steam Engines and Naval Construction.

An Officer for Naval Manœuvres.

A Staff Officer for Submarine Mines.

Two of the company Officers act as instructors of simple navigation.

The civilian staff of professors consists of—

Six 1st class professors of sciences, with a salary of 4,000 lire¹ (increasing to 5,000).

¹ 1 lire = 1 franc.

Four 2nd class professors (3,500 lire per annum).

Eight 3rd class professors (3,000 lire per annum).

Six 1st class assistant professors (2,500 lire per annum).

One 2nd class assistant professor (2,000, 1,500, or 1,000, according to the numbers in his class).

Two Laboratory Assistants.

One 1st class Professor of Drawing, &c.

Three 3rd class Masters of Fencing and Gymnastics (1,500 lire).

Three 1st class Assistant Masters (3,000 lire).

Two 2nd class Assistant Masters (2,000 lire).

Two Laboratory Compounders (1,500 lire).

The admission to the Academy is by competitive examination, which takes place annually at the beginning of October; and the conditions of admission are:—

To be an Italian subject.

To be not more than fifteen years of age within the year of examination.

To be strong and without physical defect, able to read at first sight letters No. 15 of the Snellen Scale, at a distance of at least 12 metres with both eyes, and 6 metres with one eye; and free from colour blindness.

To be of good conduct.

To have father, mother, or guardian's consent to voluntary enrolment, before being nominated Officer.

To obtain the required standard in the competitive examination.

During their sojourn at the Royal Academy pupils must pay 800 lire per annum, paid quarterly in advance. Candidates, however, who belong to the following categories may obtain a remission of half these annual payments.

(a.) *For Family Services.*

1. Sons of naval and military Officers, and of civilians in the service of the State with a right to pension, provided they have not quitted the Service voluntarily, or through any culpable reason.

2. Sons of Officers decorated with the military order of Savoy, the military or naval order of valour, or the medal "dei mille."

3. Sons of Officers who have taken part in two or more campaigns.

4. Youths belonging to families who, through some signal service to the State, have acquired a claim to special merit, and have shown themselves worthy of particular consideration.

(b.) *For Personal Merit.*

1. Youths who in the entrance examination have taken one of the first ten places, provided they have obtained at least 80 per cent. of the marks.

2. Youths who take one of the first ten places at the end of each

yearly examination, provided again they obtain 80 per cent. of the marks.

A student may thus obtain a complete remission of all payment half through family services, and half through personal merit.

The privilege of obtaining a remission of half the costs for maintenance for family services extends over the whole course at the Academy, but is suspended in the event of the recipient having to repeat any one of the courses, through failure to pass any of the yearly examinations.

This privilege, however, when gained for personal merit extends for one year only.

The candidate's outfit must be paid for by the parents. This amounts to 800 lire, and may be paid in two instalments.

The instruction is divided into two courses—

1. The normal course.
2. The higher course.

The instruction in the normal course is theoretical and practical, and the subjects are divided into five classes. That in the higher course is divided into two classes, the first of which only is obligatory.

The theoretical instruction in the normal course lasts eight months in each year, *i.e.*, from the beginning of November to the middle of June. The practical instruction lasts three months, from July to October, on board of one or more vessels placed at the disposal of the Academy.

Examinations are held yearly, by which is determined the promotion of a pupil to a higher class. If a pupil fails to pass the examination, he is permitted to repeat the course; but this privilege is granted once only. Should he fail a second time, he *ipso facto* ceases to belong to the Academy, and is sent back to his family.

Final Examination.—On attaining eighteen years of age, the students, who have passed the examination at the end of the last class of the normal course, are nominated Midshipmen, provided they have spent at least twelve months on board some man-of-war. The final examination of the Royal Academy takes place under the supervision of a Committee, nominated by the Minister of Marine, and presided over by an Admiral.

The Higher Course.—First Period: When a Midshipman has obtained his promotion to Sub-Lieutenant, he must rejoin the Academy in order to attend the first period of the Higher Course. Those who are successful in the yearly examination are declared fit for promotion. In case of failure, a student may repeat the course once, but only once. The following are the subjects of study:—Applied Mechanics, Technological Chemistry, Technological Physics, Theory of Naval Construction, Steam Engines, Projectiles, Manœuvres, Tactics, and Naval Warfare, Hydrography, Military Law, International Law, Fencing, Musketry.

Second Period: The second period of the Higher Course is voluntary for Sub-Lieutenants who have passed the examination at the end of the first period. Officers of higher rank are also permitted to

follow this portion of the course. The Officers who pass successfully through the second period of this course receive a diploma, which entitles them to successive promotion in the Service.

Nomination to the Corps of Naval Engineers.—The students of the Academy who, from special aptitude and inclination, desire to follow up their career in the corps of Naval Engineers, must notify their intention to the Commandant of the Academy, after passing the yearly examination of the 4th class of the normal course.

This privilege is limited, however, to students who, in the examinations of the 4th and 5th class, obtain 80 per cent. of the marks in the Examinations in Sciences.

Those who comply with these conditions and whose application has been favourably received, are nominated Student Engineers in the corps of Naval Engineers, as established by the 17th article of the Law of December 3, 1878, on the organization of the personnel of the Royal Navy.

In order to obtain their nomination as 2nd Class Engineers, the students must follow a finishing course at the Higher Naval School at Genoa.

Nomination to the Commissariat Corps.—Should there be amongst the pupils at the Academy any who, however willing and of good conduct, have not the inclination to follow up the career of the General Staff, they may enter the corps of Naval-Military Commissariat, admission to which is by special examination.

Discipline.—All offences committed by the pupils are punished according to the scale laid down for the internal regulation of the Academy. The case of any pupil who shows himself callous to punishment, without giving any hope of changing his conduct, is brought before the Minister of Marine with a view to his expulsion from the Academy.

Dismissal of Pupils for Medical Reasons.—In the event of a pupil being in such a state of health as to prevent him from continuing in the Service, the Commandant will, on the opinion of the doctors of the establishment, to which may be joined that of other superior military medical officers or eminent civilian doctors, bring the case before the Minister with a view to his being sent back to his family.

The Council of Administration is composed as follows:—

The Second in Command, President.

The Officer in command of companies, member.

The Senior Company Commander.

The Chief Medical Officer.

An Administrative Officer, as Director of Accounts and Secretary.

The duties are to supervise all financial matters of the Academy; following the mode of procedure laid down in the regulations, and the rules in force for the Royal Navy.

The Council of Discipline is presided over by the Admiral in chief command, and composed of the Second in Command, the Officer in command of companies, the company Officers, and the Commandant's secretary.

The Rules of Administration.—During the normal course the Administration of the Institution has charge of the lodging and feeding of all the pupils at the Academy. Provision is made in a special and well-appointed building for the sick. All expenses for instruction and the necessary books are defrayed by the Administration. The families of the students are charged only for non-obligatory expenses, such as telegrams, stamps, journeys, non-regulation but permitted or authorized books, and finally, for such as are attributable to damage due to carelessness of the pupils.

Personal Accounts.—A sum of 240 lire is deducted annually from the costs of maintenance, and is credited to the personal account of the pupil, to defray the expenses of the repairs and renewal of his kit, and for washing bills and the purchase of toilet requisites. Should this sum be insufficient, the pupil must make good the deficiency. This personal account is closed at the end of the normal course, and sent to the pupil's family, together with a demand for any deficiency, or a credit note for any surplus there may be.

Students of the Higher Course.—The Officers who are attending the higher course are outside students of the Academy. They form a mess of their own, as on board ship; they defray all its expenses, as well as pay for all the text-books of the subjects under instruction.

The Examination.—The examination of candidates who have proved themselves medically fit commences at 9 A.M. on the 1st October, at the Royal Naval Academy. The Board of Examination is composed as follows:—

President.—The Second in Command and Director of Studies of the Academy, or a Post Captain.

Members.—Two superior Officers, and as many Officers and Professors of the Establishment as will form at least two sub-committees, in each of which there must be two Officers and two civilian Professors.

On the first day the candidates do a written paper on the Italian language, and one on arithmetic, set by the Board. These written papers are done under the supervision of the Board, and are private. On the succeeding days the oral examinations take place, and are public.

The following are the subjects of examination:—

Obligatory.—Italian language, 3 hours' written, and 20 minutes' oral, examination. Arithmetic, 2 hours' written, and 20 minutes' oral. History, 15 minutes' oral examination. Geography, 15 minutes' oral examination.

Voluntary.—French, English, and German, 15 minutes' written and oral examination.

(To be continued.)

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NOTICES OF BOOKS.

Our Great Military Commanders. By C. D. YONGE. London: Ward and Downey, 1892. Pp. 413. Size $7\frac{1}{2}'' \times 5\frac{1}{2}'' \times 1\frac{3}{4}''$. Weight under $1\frac{3}{4}$ lbs. Price 6s.

This book contains a series of sketches of the lives of the Duke of Marlborough, Lord Clive, Duke of Wellington, Sir Charles Napier, Lord Gough, and Lord Clyde.

Cressy to Tel-el-Kebir. A Narrative Poem, descriptive of the Deeds of the British Army. By C. R. LOW. London: Mitchell, 1892. Pp. 343. Size $9'' \times 6'' \times 1\frac{1}{4}''$. Weight under $1\frac{3}{4}$ lbs. Price 10s. 6d.

This is a special form of military history, a narrative poem, the metre being "that adopted by Scott in 'Marmion,' Byron in 'The Giaour,' and by Coleridge, Moore, Campbell, and other poets."

Our Home Army. By H. O. ARNOLD FORSTER. London: Cassell and Co., 1892. Pp. 148. Price 1s.

This is a reprint of letters published in "The Times" in November and December, 1891, with a preface and notes, to which are appended suggestions for removing some of the existing defects in the condition of the British Army on the Home Establishment.

Admiral of the Fleet Sir Provo W. P. Wallis, G.C.B. A Memoir. By J. G. BRIGHTON. London: Hutchinson and Co., 1892. Pp. 299. Size $9'' \times 8\frac{1}{2}'' \times 1\frac{3}{4}''$. Weight under 2 lbs. 6 ozs. Price 16s.

An interesting account of the life of the well-known veteran sailor.

Smuggling Days and Smuggling Ways; or the Story of a Lost Art. By Lieut. the Hon. HENRY N. SHORE, R.N. London: Cassell and Co., 1892. Pp. 287. Size $8\frac{1}{2}'' \times 6'' \times 1''$. Weight under 1 lb. 6 ozs. Price 7s. 6d.

The author's apology in his preface for adding yet another drop to the stream in the already over-crowded state of the book market is quite unnecessary, for he has produced a book which is well worth reading. It enlightens the public generally on the subject, and also gives most interesting information with regard to the Coast-guard duties.

A General and his Duties. By Brigadier-General "B." London: Gale and Polden. Pp. 76. Price 1s. 6d.

The anonymous Brigadier-General may, perhaps, have found from his own experience that his brother Generals are ignorant of what he tells them in this little book; but, if so, Heaven help the British Army!

Journal of the United Service Institution of Victoria for the Year 1890-91. Vol. I. Edited by Captain F. R. REYNOLDS. Melbourne: Brain, 1892. Pp. 160.

The Colony of Victoria may be congratulated on the formation of the Institution, of whose Journal we have received the first volume. The papers are well up to the

mark. There is, however, a short addendum on the war game, which seems to be very significant as throwing light on the small amount of professional knowledge possessed by at all events some of the Officers of the Colonial forces. The war game is beyond them, and is not to be taken up at first "because it requires a knowledge of tactical principles."

Disposizioni Vigenti sulle Pensioni Militari in Italia ed in Altre Nazioni. By DANTE PARENTI, Ufficiale Commissariato Regia Marina Italiana. Livorno: Giusti, 1892. Pp. 304. Size 8" x 6½" x 1". Weight under 1¼ lbs.

This is an interesting work giving information on pensions and pay of various European armies.

Friedrich, Napoleon, Moltke. Aeltere und Neuere Strategie. By HANS DELBRÜCK. Berlin: Walther, 1892. Pamph. Pp. 55. Price 1s. 6d.

An interesting pamphlet.

Messrs. Gale and Polden have published a useful pamphlet, *Changes in the New Infantry Drill*, 1892, with *Explanatory Notes*. It is compiled by Quartermaster W. GORDON. The price is 1s., post free.

Modern French Artillery (the St. Chamond, De Bange, Canet, and Hotchkiss Systems), with Illustrations of French War Ships. By JAMES DREDGE. Chiefly reproduced from "Engineering." London: Offices of "Engineering," 1892. Folio. 500 pp. of Text, Tables and Plates, and over 700 Illustrations. Weight 9 lbs. 6 ozs. Price 2l. 10s.

This is a work beautifully prepared for the press. The information in it has been furnished in all cases from the manufacturers whose work is referred to, either direct or from authoritative publications. A large part of the volume is devoted to the artillery practices of the Forges et Chantiers de la Méditerranée, owing to the leading position this company occupies, and the great amount and variety of artillery it produces. Every page has been subjected to competent French criticism. A chapter is added on the French Navy. The illustrations are excellent.

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LIEUTENANT-GENERAL SIR ROBERT BIDDULPH, K.C.M.G., C.B.,
Director-General of Military Education, in the Chair.

MILITARY GEOGRAPHY.

By Colonel J. F. MAURICE, C.B., p.s.c., Professor of Military Art and
History, Staff College.

THE subject with which the Council of this Society has asked me to deal this afternoon is a large one. I fear a little lest, interesting and important as it is to all soldiers in itself, the mere sketch of its character which our time permits may make it dull for want of illustration. I shall endeavour to avoid that as far as I can, but after all a catalogue of the most interesting books in the world would be dreary reading to those who knew nothing of their contents. The one consolation, therefore, that I have in speaking to you is that I am sure that that is by no means the case. You wish me rather to be in the position of the man who, in merely naming Dickens' works, suggests the pleasures you have derived from the humour of the "Pickwick Papers" and the pathos of "Dombey;" in naming Thackeray brings before you a gallery of familiar faces. You wish me, in fact, rather to express facts familiar to us all than to introduce you to anything that is very new, and must be dreary if it does not receive illustration from your own knowledge and experience.

Military Geography, then, as I understand the term, deals with all those conditions of the surface of the world which affect armies, campaigns, and battles. I do not think that it is possible to separate off from it the minor features of the earth's surface, which we more especially associate with "topography." Our doing so is, I think, an accident of military education. We most of us, in fact, learn to take

in with the eye the features of land under our eyes by actually sketching them. The consequence is that we are very apt, in practice, to talk as if military geography was concerned only with the greater features of a country, its military frontiers, its great mountains and rivers, and so on, and as if the question of the character of a battlefield or the nature of a bridge were pure questions of "topography."

I am not very keen about definitions, and I am by no means sure that, as a matter of mere Greek derivation, this, my assumption, might not be shown to be wrong. What I do care about is the practical question of the effect of any separation of the two things upon the conduct and movement of armies. I had an experience in regard to this very early in my military career which strongly impressed me. Being, I am afraid, in those days, perhaps now, not altogether ready to accept without investigation an established dictum simply because I was told it was the correct thing, I was sorely puzzled by certain explanations which were offered of a particular movement of Napoleon's during the 1814 campaign. I could not understand why he moved as he did. I felt sure he had some very good reason for doing it, but on the ordinary maps the movement, with the details of which I need not trouble you, seemed to be wholly unaccountable. It upset my ideas of the principles on which he acted. The very worthy "crammer," if I may use the term without offence, to whom I went to study military history before going up for the Staff College, would not hear of my objections. Nevertheless, I was not satisfied, and continued my hunt for a cause; when at last, after much research, I, to my infinite joy, discovered, I think in Thiers, a careful description of the nature of the bridges over the Seine, the river towards which Napoleon was then moving. It showed that one particular bridge was a wide massive stone structure, practically indestructible by an army in the field, within the time Napoleon need give to his opponents. The others were slight narrow wooden structures, easily defensible, easily destructible. Instantly the meaning and the motive of Napoleon's disposition of his troops stood revealed. It depended not on some elegant strategic combination such as one might make on a sheet of paper, but upon what I shall venture to call the military geography of the theatre of war.

Perhaps, though it has only an incidental bearing on the subject, I may as well, as I have mentioned my "crammer," say how, from his point of view, the story ended. I sat down, a rather trembling Subaltern, to open my military history paper, with the name upon it, as examiner, of a man long since dead, whom I already knew as a very brilliant soldier, of whom I had the most profound awe. The first two questions that met my eye were: 1st, a request to account for this particular movement of Napoleon's; 2nd, a request for a description of the bridges over the Seine. Instantly I felt that we understood one another. You will, perhaps, forgive me if I thus give point to this particular personal illustration, because I practically have always dated from that moment one of the most valued friendships of my life, and certainly I look upon it as

MAP OF EUROPE.

SHOWING POLITICAL BOUNDARIES.



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MAP OF EUROPE

SHOWING POLITICAL BOUNDARIES

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the starting point of any confidence that I have since then acquired in dealing with the study of military history.

The point, then, that I wish to make is, that military geography, in all its branches, whether it deals with the larger or the smaller features of the earth's surface, is the essential handmaid of military history, past, present, and future. I hardly think that the two subjects can ever be studied with much profit apart from one another. It is, to my mind, a most dreary thing to study, either in the present day or the past, for instance, the military frontiers of the different Powers of the world, unless you connect that study with the historical circumstances which have affected them and been affected by them, and with the opportunities which they present to each of the Powers for either defensive or offensive action. Similarly, I never could myself take much interest in the mere enumeration of the fortresses of a country or description of its main lines of road or other means of movement, except in connection with the history of past campaigns or as part of an analysis of the best mode of attacking or defending it at the present time.

Now, it so happens that all the greatest Continental soldiers of the last twenty years have been at the pains to give all those who care to study their work, practical lessons of this kind in regard to military geography which are quite invaluable. I have often said that if one could have desired to invent, for the purposes of military study, a series of imaginary frontiers with kingdoms behind them, each so varied from the other that in no two should there be a sameness in the lesson, one could not have devised a series so instructive in their variety as the European military frontiers and kingdoms of to-day.

Each of them is based on a well-thought-out principle, in the carrying out of which great military nations, whose whole energy and capacity is concentrated on readiness for war, have each of them expended millions of money. I could not, of course, discuss these this afternoon with sufficient detail to make them intelligible to those who know nothing about them. But consider how varied they are.

France has her great frontier girdle of fortresses; her *forts d'arrêt*, closing every road except at the two gaps which she has designedly left open to admit an enemy, in order that she may there have him at her mercy; her great scheme of entrenched camps giving her both the means of concentrating the powers of the south to strike against an invader moving on Paris and a means of aggression from her old "gap of Belfort," now become sally-port of Belfort. All these are based on the most careful consideration of the geography, and, if I must make the distinction, topography, of the country. Behind them all—Paris the greatest fortress of the world.

Look across the border, what a contrast! Germany now possesses, as her advanced frontier, the old French mountain barrier of the Vosges, and she defends it, how?

Study the condition of her military map, and it will tell you her strategic secrets. But if you are to read them aright, you must not ignore, as questions vital to military geography, the nature of the bridges over her great second military line, the Rhine, nor fail to

watch at the railway stations the vast accumulation of what we in England should call sidings and platforms. She does not require, actually, sidings and platforms as we do, because her carriages give facilities for descent between the rails for men, horses, and guns. But the accumulation of debarking places is enormous.

See, too, on the map, how many minor fortresses have disappeared from it since 1870. Practically all, within the Reichsland, are either dismantled or ignored, except Strasbourg and Metz. Those, indeed, have grown prodigiously—have become enormous entrenched camps. Her meaning is on the surface. Active and rapid accumulation of troops by rail, pivoting on two great fortresses, a river in rear of them, the possession and passage of which she guards by very numerous fortified bridges, both for railways, carriages, and foot passengers. In rear of the great river a few great fortresses, almost all of them fortified camps, placed at her favourite point, the meeting of two great rivers, so that an enemy who attempts to attack them is divided into three separate sections.

Look to the other side of Germany, at her system against Russia.

In principle it is, no doubt, the same, viz., the complete development of the facility of movement by road and railway—specially by railway—a few fortresses, very powerful, and giving command of great bridges, important lines of communication, or the only easy line of march for armies. But how different is the country to which it is applied, and how interesting it is to see how she has dealt with the new geographical considerations! On this side of Europe we are no longer, as in Elsass-Lothringen, or, shall I say, Alsace-Lorraine, in a land of mountains, but in the great plains of the north-east. It is a land of lake and marsh, of dust and mud. Here the one great river, which at different parts of its course is held by Austria, Russia, and Germany, by great fortresses, is the Vistula. It is, in fact, the one grand topographical feature of the country. Thorn and Dantzig, with two other bridge heads, give Germany command of her part of the river. She has developed, as on the other side, her railways, behind and across the Vistula, into East Prussia, and between the lakes which form the southern borderland of that outstretched arm of Germany she has constructed sufficient forts to protect the gathering of her armies and to give her command of the roadway. Her frontier towards Russia, on the western border of Poland, is a land of marsh, guarded by great fortresses, which close the only advance of an army that would not be slow and difficult. To gain time for active strategic movement, to keep an already slower enemy hampered by endless delays: these are the advantages which she seeks to gather from such geographical conditions.

Russia, on her side, presents, as I think, a somewhat deceptive character in what is suggested by the first look at her map. If military geography were represented simply by the outlines of maps, then it would seem as if Russia directly threatened the capital of Germany, which, unlike that of France, is an entirely unguarded town. But there are many conditions properly belonging to military geography which are admirably illustrated by the contrast

which reality presents to this appearance. Russia can only, for the purposes of a direct invasion of Germany across her west Polish border, make use of two lines of railway, one of which runs into the great German fortress of Thorn, beyond the north-west corner of Poland, while the other runs completely away to the southward point of the western border, thus largely fixing for her the possible direction of the advance of her armies. She has not, as Germany has, railways running directly towards the common frontier of Poland and Germany. Further, I should claim that it is a necessary part of the duty of military geography to take account on the surface of the earth, not only of the actual mountains, rivers, railways, fortresses, &c., but of the conditions of the "insect man" upon that surface, in so far as these affect the movements of armies. Under that aspect the condition of the western portion of Russia is peculiarly interesting. The Russian railways have all had their direction determined by autocratic power for strategic purposes. The curious result is that those black lines on the map, which indicate for you the direction in which the railways run, represent in fact two entirely different things on the opposite sides of the frontier. Germany, like Russia, has been anxious to secure facilities of movement for her troops by the organization and working of her railways. But she has done this with a careful solicitude for the needs of commerce, which enables her to work her railways with a large staff, and a reasonable profit to the State. The consequence is that the daily working of the railways kept up by her for the ordinary purpose of commerce and traffic are far more effective means of military transport than those which have been constructed by the Czars solely for the purpose of military advantage, altogether regardless of commerce. I think, perhaps, it would hardly be fitting that I should here, and to you, speak fully of those conditions of the population of Poland and of the neighbouring provinces, which will undoubtedly, in the event of war, very largely affect the movements of the opposing armies. But I want to note in passing that, as such conditions as these must be taken into account in any strategical examination of the theatre of war for the purpose of determining beforehand what operations are to be carried on in it, they are for our purposes an essential part of military geography, though no doubt the scientific people might object that these were properly ethnographical considerations.

The great system of fortresses by which Russia holds Poland presents characteristics essentially determined by the conditions of the military geography of the region, which are entirely unlike those of either France or Germany. There is a certain space of ground held by the fortresses of Ivangorod, Warsaw, and Novo-Georgiewsk, which has always, from the nature of the passages over the rivers which it secures, given to its possessor command of the muddy plains of Poland. The great fortress which stands back from these—Brest Litewsk—is necessary to keep up the connection with the great mass of Russian territory. The enormous marshes which separate Russia from the Polish region present so great a difficulty for the movement

of her troops, that it is essential to have a great fortress at the point where the one railway, across the marsh eastwards into the heart of Russia, meets the various communications which run in towards Poland from the regions to the north and south of the marsh. Behind this frontier region the vast distances, the slender modes of communication which the map of Russia represents determine now, as they have determined in former days, at least in a very important degree, the strength and weakness of Russia.

The geographical characteristics of Austria are again in many respects very distinct from any of these that I have sketched hitherto. It is essentially her geographical position which is at once her danger and her strength. The formidable mountain region of Transylvania, where the Hungarians in 1848 fought so magnificent a series of battles, gives now to the dual Monarchy, as in the days of the Crimea, the complete command of the approach of Russia upon Constantinople. If she stood alone there can be no doubt of the dangers which this powerful weapon of offence would entail upon her. It makes her the chief obstacle to all advance towards Constantinople.

The northern frontier of Austria as towards Russia presents the peculiarity that the border province of Galicia lies between the Vistula and the Carpathians, while a series of rivers of some importance, notably the San, the Wysloka, and the Donajec, run down from the mountains into the Vistula. No country has in former years elaborated a system of fortresses for the possession of a kingdom more complete than that which Austria carried out in Lombardo-Venetia. Along her Galician frontier, on the contrary, it is only of late years that she has taken to constructing very solid works of permanent fortification. It will show, perhaps, the intimate connection between military history and the military map of a country of which I have spoken, if I note that the fact that for many years Austria had relied upon the friendship of Russia, together with the embarrassed state of her own finances, induced her in Galicia to avoid committing herself to the expense of permanent fortifications. When she provoked Russia in 1854, it became necessary to construct vast temporary field works. This had been her resource, in fact, whenever an emergency pressed upon her. Now works of field fortifications, relatively economical and effective for the moment as they are, have the disadvantage that they do not remain effective for very long. Hence practically, during the present period of European politics, when Austria found herself face to face with a bitterly hostile Russia, and when her ally Germany required that she should set her house in order, so that the alliance might be effective without throwing an undue strain upon Germany, Austria found herself with practically the whole work of making a fortified frontier in Galicia to be begun with a clear field. She appears to have fortified the Carpathians with certain works tending to at least delay the movements of an army by the only passes which are available; to have secured the command of the most important part of the Vistula within her region by making a first-class fortress and entrenched camp at Cracow, and by securing as a second pivot

for the movement of her armies powerful works at Przemyśl and Lemberg. These works, together with that necessary accompaniment of any modern system of national defence, namely, a great development of her railway system for military purposes, have been the changes in her military map; in the study, that is, of her military geography, which her present political situation has entailed upon Austria. There can be no doubt that the broad outlines of what she designs in view of future war, may in her case, as in others, be traced in what she has done.

Of the opportunities presented to her for offensive war, carried out in alliance with Germany, I have, I think, indicated as much as space will permit me in what I have said already of the frontiers of Russia and Germany. Had she to defend Galicia, there can be little doubt that she would not fall back by the Carpathians, but, employing merely a retaining force within the passes, would take up as successive lines the San, the Wysloka, and the Donajec, threatening a flank attack upon any Russian army that should attempt to cross the Carpathians ignoring the force in Galicia. Thus this frontier presents peculiarities both in its military geography and in the strategical methods which are determined by it, essentially different from any of those we have had to consider elsewhere.

I might enlarge, if time permitted me, upon the contrast presented by the territorial frontier of the fifth great Continental Power—Italy. She, like Germany, to the west has as her land frontier a great mountain barrier. But the snow-clad Alps are a mountain frontier of a very different character from the Vosges. Even here the student of military geography will find a new example worthy of altogether independent study in point of principle from any of the rest. It has been treated, moreover, with that freshness and originality which one might expect from the soldiers of a young country, full of national enthusiasm, and unhampered by the traditions of the past. But the frontier of Italy presents another feature far more interesting to us as Englishmen. Italy possesses a seaboard of such an enormous extent in proportion to her territory, that for her the important frontier is less her great mountain barrier than her coast. All her statesmen and her soldiers, at least as much as her sailors, feel that it is the seaboard of Italy which it is all-important to defend. Hence the relatively great development of the Italian Fleet, hence the anxious desire to maintain those cordial relations with a great naval Power which happily do not depend only upon mere considerations of mutual interest as between England and Italy, but upon those much despised, but all-important, factors of so-called sentiment; upon the hearty sympathy with which from the first England has watched the development of the youngest and oldest nation in Europe, and the complete recognition of that sympathy by Italy.

There can be no doubt that for us, the rise of the Italian Power more than any other event of our times has changed the centre of interest of the military geography of the world for Englishmen. The sea-washed shores of the outer world must always be our closest points of contact with it. The enormous development of our

Colonial Empire, due mainly to our dominion over the sea, naturally caused during many years of the present century the attention of Englishmen, and therefore of English soldiers, to be directed towards our own parts of the world almost to the exclusion of Europe. But two events, of which the rise of Italy is the first, and the approach of a great European Power towards the frontier of India is the second, have changed all that for those who have carefully studied the present signs of the times. I hardly venture, towards the close of my lecture, to touch upon all the problems which are involved in the military geography of our great Asiatic Empire. But I think it will be sufficient to say, first, that Russia is now so near to us in India that we can hardly any longer regard ourselves as having the sea as our sole important frontier, at least as long as we consider, as most Englishmen do, that the defence of the Indian frontier is an essential part of the defence of England; secondly, that she is still so distant from our Indian Empire that it is extremely difficult for us, without great military risk and without handing over to her many of the advantages which the geographical situation at present possesses for us, to forbid her approach in a most dangerous manner step by step towards our frontier. Therefore it is that it becomes exceedingly important to us to inquire whether there may not be geographical conditions in Europe which tend to redress the balance in Asia. I certainly think that there are. The rise of the Italian kingdom with its great seaboard frontier is only one of them. The fact that Italy is an essential constituent of an alliance in which two Powers great as military States, and relatively inferior as naval ones, bear the most important parts, make the means by which alone Italy can be made an effective military member of the alliance as important to them as to her. But even more important to them is the essentially seaboard frontier of Denmark, and the extent to which in all movements of troops between Russia and Germany the whole advantage rests with the Power that commands the Baltic.

The full consideration of all these questions is a matter of the actual study of military geography. They could not be dealt with in a single lecture in which it has been my object rather to take the subject which the Council has assigned me: to show the scope, the variety, and the importance of its interest, and to urge its careful study upon all soldiers, statesmen, or other Englishmen who may have to deal with the problems of the future as they concern our country. For the reasons which I explained in the beginning of this lecture, I have preferred to take the method of illustration rather than that of an abstract setting forth of the principles of the study of military geography. Even for that purpose of illustration, I might have adopted a different method. I might have taken any one or more of our modern campaigns, or of the greater contests in Europe or America, and have shown how a military analysis of the geography of the country was an essential element in determining the conduct of each of them. But on the whole it seemed to me that at the present moment the particular illustrations that I have chosen would be the more interesting, and I can only hope that they will have

fulfilled what I take it was the purpose of the Council, that of drawing attention to the vital importance of this most interesting study.

Dr. MAGUIRE : It appears to me that it would be a pity there should be no discussion following upon such a very interesting lecture ; and, accordingly, though a young member of this Institution, I trust you will allow me to say a few words, not by way of criticism, but rather by way of supplement to Colonel Maurice's lecture. I can scarcely imagine any more interesting situations to the theoretical student of history, or to the practical student of the art of war, than those which Colonel Maurice has so ably brought before us. My wonder is that such a large proportion of young English Officers and gentlemen are allowed by their teachers and others to come to somewhat mature age without having some better knowledge of geography, which appears to me to be the basis of the knowledge of history, and, indeed, with so very little knowledge of history itself. I hope, however, that when gentlemen like Colonel Maurice make such remarks as those that appear at the end of his lecture, the attention of the authorities will be forcibly directed to taking steps to secure that English education of the future will not be so defective in these material matters as it now is. I cannot imagine any more interesting way in which a young man even for amusement, not to speak of profit, can spend his time than by taking up a good map and on it following some striking campaign. Unfortunately, one of the maps exhibited to-day is difficult to see from this distance. It is a very valuable map carefully constructed, I believe, by the eminent geographers in the employment of Mr. Stanford, and it shows at a glance the great lines of invasion, not merely that exist now, but that have existed in all ages. I was watching that map the other day when reading some ancient history, and it was astonishing to see that the very routes indicated by Colonel Maurice were the routes taken, as far as tradition teaches us, by the terrible invasions that destroyed the Roman Empire. The map is an exceedingly good one, and if it could be made twenty times larger, it would become invaluable for lectures on military history. Looking at it, one will see that on starting from Russia, as Colonel Maurice indicated, and trying to get to ancient Gaul or Italy, or into the countries around these old objects of barbaric greed, the invading hordes were hampered by the same kind of obstacles that would now hamper invading armies. When they got round the Carpathians to the south or the north, and then had to get down into Italy, they found great rivers and the mighty masses of the Alps blocking their way. Transylvania and the Banat and the Valley of the Drave were to the strategists who had to defend Rome and Byzantium what they now are to Turks and Austrians and modern Italy. The lecturer said he would illustrate these matters from current history, and could equally display them by reference to the past. It would be particularly interesting to see that in past history all the great military movements, backward and forward, surged along the Valley of the Danube towards the Rhine, or, taking a side direction, got involved in the Valley of the Po. For instance, Napoleonic times, taking the campaign of 1796, from the Main to Bohemia, and the Middle Rhine to the Isar, and the Riviera on to the Drave; and again, in 1800, Moreau from the Rhine between the Lake of Constance, and Napoleon across the Alps and across the Po; and, again, the campaign of 1805, when Napoleon started from the Main and the Rhine, and at the same time Massena was moving to the Italian Quadrilateral. In 1809 and 1814 also, it is particularly interesting to see how the operations in the river valleys, eastward and westward respectively, were linked by the gaps in the mountains: for example, by the passes in the Tyrol and by the violation of Switzerland's neutrality. These are suggestions that merely came into my mind whilst listening to the admirable address of Colonel Maurice. Many other suggestions might be given if one had time, but I think I have said enough to show that we are grateful to the Colonel for stirring up memories of the past as well as for his views about the problems of the future. I would further ask the lecturer what he means by stating, with regard to Italy, that the example quoted "has been created moreover with that freshness of originality which one might expect from the soldiers of a young country full of national enthusiasm and unhampered by

the traditions of the past." I should like to know if Colonel Maurice refers to the most instructive treatise on Strategic Geography by Colonel Sironi.

Colonel MAURICE: I did not refer to any one author. I was thinking of several. It always seems to me one of the most interesting facts we have to do with in connection with the Italian Army that they have entered into these questions unhampered by those traditions of the past which, to a certain extent, tie us all—that the Italians, coming in with a brand new army, naturally deal with these questions with a perfectly unbiassed mind, and that all that has been done in that line seems to have been thought out by themselves and not taken from the mere forms of France, Germany, and Russia, or from things as they are.

The CHAIRMAN: If no one is anxious to ask any further questions of Colonel Maurice I will only venture to say, on my own behalf, how much gratified I have been to hear the lecture. I feel that it is a subject which cannot be too prominently brought to notice. The study of Military Geography is one that has this advantage, that it continues from all ages; the student of Military Geography is not like the man who, having learned the art of using the bow and arrow, finds that he has lost all his previous training when he has to learn the art of making gunpowder. The same considerations which were alluded to by Dr. Maguire prevailed in the invasions of these countries a thousand years ago as they do now. Therefore it is a study which has a continuity about it which is very advantageous to the student. It was not very long ago that a suggestion was made to me in the Department over which I preside at the War Office, that instead of teaching soldiers, or requiring them to learn history and geography at the Army Schools, we should teach them Military History and Military Geography. I felt bound to say that I thought that it would be difficult to study Military History and Military Geography without having some acquaintance with general history and general geography in the first place, and I think we may say that that applies very specially to geography, because Military Geography is really the application of the geography of the country in so far as it concerns the exigencies of campaigning. I am afraid it is a subject which is somewhat neglected not only in the Army, but in all classes. I may refer to what was written for us the other day in the "United Service Magazine" by a gentleman who has had experience in training candidates for the Army, in which he gives several somewhat ludicrous instances of the ideas which some of his pupils had of history and of geography. I think that their failure to understand properly the several points was due more to defects in their general education, than in any training they may have had for the Army; because the mistakes they made would have been as regrettable in a young merchant or a young lawyer as in a young soldier. I need not say more, except to ask you to allow me to offer to Colonel Maurice on your behalf the thanks of the Institution for his interesting lecture.

Wednesday, May 4, 1892.

ADMIRAL H.R.H. THE DUKE OF EDINBURGH, K.G., K.T., G.C.B.,
&c., &c., A.D.C., Commander-in-Chief, Devonport, in the Chair.

ELECTRICITY AS APPLIED TO TORPEDO AND OTHER NAVAL PURPOSES.

By Lieutenant F. T. HAMILTON, R.N.

IN May, 1885, a lecture on this subject was given at this Institution by Lieutenant, now Commander, Batten, when Sir Cooper Key took the chair. Since that time, although we have not learnt very much that is actually new about electricity, great advances have been made in perfecting the methods of application, and, as a necessary consequence of competition among manufacturers, the material used becomes better and cheaper every day; therefore its use for naval purposes has become more extended. At one time there was a great tendency to elaborate most intricate machines, which were expected to do everything short of talking, but the more practical experience we get the more we see that electricity, for naval purposes, must be applied in such a manner that the instruments and machines used must be simple, and made in such a way that they will stand the exposure and rough usage inseparable from ship work.

In dealing with this subject, there is not time in the limits of a short lecture to go into the whole question, or to go over again any of the ground trodden by Commander Batten, nor, indeed, is it necessary; therefore it is proposed now merely to make a sketch of the principal points on which we have made advances since 1885. And to facilitate comparison, I will take the different branches of the subject as near as possible in the same order as in the 1885 lecture.

Electric Lighting.

Taking, then, electric lighting first. The internal lighting of men-of-war has now become the rule instead of the exception; it is found that it is economical, clean, and convenient, and, except in the case of quite small vessels, where space does not admit of duplicating the dynamos, and the complement does not admit of telling off special men to tend the machinery, it is invariably fitted. A trial was made at one time of using the hull of the ship as a return, and the "Polyphemus," the P. and O. steamer "Massilia," and Brazilian

ironclad "Riachuelo," and other vessels, were so fitted. The advantage of such a manner of fitting is only economy; the disadvantage is an increased risk of an accidental breakdown, for this reason: If you have a complete wire system, a leak on one lead does no harm, and a second leak on the same lead does no harm; it is only when a leak occurs on both leads that harm is done, whereas with the earth return system a single leak at once disables a part of the circuit, thus doubling the chances of a breakdown. The complete wire system is therefore, always used now, an alternative system of candle lighting being always fitted as well in English men-of-war, the reason being not so much to provide against breakdowns, as with the amount of dynamo machinery now supplied that is an unlikely occurrence, but to provide against the contingency of not being able to light your fires, or of wanting to economize coal. This latter point, viz. economy of coal, is a very important one. In war-time a cruiser will probably require every pound of coal she can carry for steaming purposes, and she will probably use no electric light at all. To give an idea of what this means, practically, a vessel of the "Latona" class would use about 5 tons of coal for keeping her internal lighting going for a week, and the space occupied by this amount of coal would stow candles sufficient to last the ship for nearly six months. I do not mention this as a reason for not lighting ships internally, but rather to show the necessity, in war-time especially, of having the alternative system of candle lighting; or, in other words, as a general rule, electric lighting is a great economy and convenience, and, as such, we are right in employing it; but occasions may arise, especially in war, when the small amount of coal it uses cannot be spared, when no money could represent to us the value of a few extra tons of fuel.

With regard to the fittings for internal lighting, no great change has taken place, but all the smaller changes are working in the direction of making everything as watertight as possible, and the cables instead of being led about the ship in more or less clumsy wooden casings, are now made covered in lead, and are put up without any casing, the lead being considered to be ample protection.

With regard to the search light, its use has largely developed, many more being now carried; there is, however, still a great difference of opinion as to the best way of using it. Some prefer a large number of small lights (one war vessel having as many as 13), others prefer a smaller number of lights of high candle power; of course the more powerful light penetrates farthest, but it is open to the same objection as the market basket that contains all the eggs. On the other hand, a large number of lights must be confusing to those using them, and tend to make the ship very conspicuous. Another point connected with the search light that gives rise to great controversy is, whether it should be high or low; if high, the surface of water that is covered by the concentrated beam is very small, and consequently there is a difficulty in picking up an object; if low, some say that the rays striking the water are reflected upwards, and striking on the mist form a screen to objects beyond. There is one point or

which every one is apparently agreed, that the farther you go from the source of the search light, the better you see the objects it illuminates; for this reason, the smallest gunboats are given a powerful electrical apparatus, as they are always likely to be useful as electric light stations for the larger ships. Vessels are also sometimes supplied with portable search light plant, so that it can be landed at a suitable point commanding the anchorage, and well away from the ship herself. Another means by which the observer is enabled to get away from the search light is by using the automatic lamp and controllable projector. By means of an electric motor in the pedestal of the projector, it can be directed both in elevation and training, by merely pressing electric buttons at a distance. There are numerous automatic lamps, that is, lamps in which the consuming carbons are made to feed themselves by utilizing the magnetic force of the same current that causes the light, but unless we have a projector controlled in the manner I have just stated, the automatic lamp is not worth the extra complication it involves, as, if we are obliged to have a man at the projector to train it and elevate it, we may as well let him regulate the carbons by hand. The objection to the controllable projector is its weight and complication. But still the fact that it enables the same person that is observing the approaching torpedo-boat to direct the movements of the projector himself, instead of passing orders to another man (always an uncertain proceeding), perhaps outweighs the objections.

Secondary Batteries.

Having considered the advance made in electric lighting, let us now consider secondary batteries or accumulators, by which we are enabled to store up electricity, and use it again when we require it, the operation of storing only depriving us of about 10 per cent. of the current. These batteries are very convenient for burning electric light, driving electric boats, and for any other purpose for which a powerful and constant current is required. The objections to their use are their weight (as the plates composing them are made of lead), the time they take to charge, and the fact that they require most careful handling, and are easily injured if neglected, or charged or discharged too quickly. The aim of all the manufacturers has been, of course, to diminish these objections as much as possible, but, so far, not with very marked success. To illustrate one of their uses, I have got here a battery of forty of these secondary cells, kindly lent by the Electric Power and Storage Company, for giving us current to work these lights and instruments, and it will be a good example of the direction in which the makers are working if I show you how they have improved their cells. One of the great difficulties has been that if the cells are charged or discharged too rapidly, the positive plates bend and touch the negative plates, and so short-circuit the cell (as it is termed) and spoil it. The plates of the cells are made of lead, with a paste of oxide of lead adhering to the surface. In the earlier plates the lead is formed into a grid, and the oxide

placed in the holes; these lumps of oxide constantly drop out when the plates bend. In the latest form of plate there is more lead, so it is less liable to bend, and the oxide seems to stick in better. This gain in strength enables the cell to be charged and discharged at twice the rate of the earlier pattern, but as there is less oxide compared to the size of the plate, there is less capacity; that is, the cell will not store so much electricity, and also it is heavier in proportion to the work it does. The following table will give an idea of the advance made in the rate of charging and discharging, and the expense in weight and capacity at which it is gained:—

Type.	Size of plate.	Maximum rate of discharge.	Time of discharge.	Capacity.	Weight of 31-plate cell complete.
		ampères	hours	ampère hours	lbs.
L (old)	9 sq. in.	4	9	36	286
K (new)	9 sq. in.	8	3½	28	357

It is not advisable that the rate of charging should be more than 75 per cent. of that of discharging.

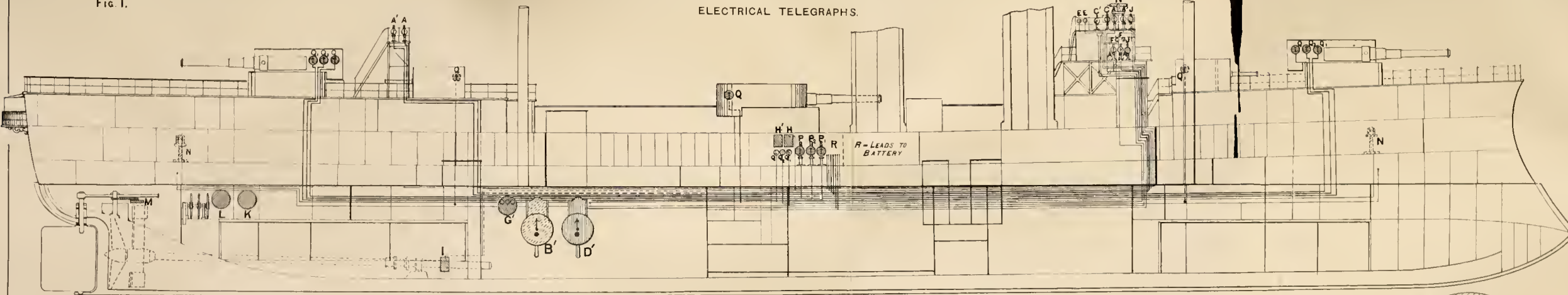
The improvements have therefore given us a stronger and less delicate cell, and one that can be charged and discharged at double the former rate without injury, but we get this at a cost of about 22 per cent. less capacity, and 33 per cent. more weight. The deterioration is now calculated at about 7½ to 15 per cent. per annum. A light and efficient accumulator is a boon we must look forward to yet; with it, steam launches would soon become a thing of the past, and we should be within a measurable distance of the flying machine. Besides the cells I have been describing, a small form is also used for taking the place of primary cells in cases where power is necessary and space is an object, such as in the case of small hand lamps; in the small form, however, the secondary cell is an expensive luxury, as it is even more delicate than the large one, and therefore its life is generally not long.

Whilst on the subject of cells and batteries, I will point out a late development of the primary battery which bids fair to come largely into use, that is, the so-called dry cell. In this the liquid is absorbed by plaster of Paris, or gelatine, or some doughy substance, so that there is nothing to upset. Hellesen's cells, which are an example of this type, were used in the small electric boat on the lake at the Naval Exhibition, for working a small magnet in the boat; they remained in use the whole time the Exhibition was open, which proves that they have great lasting power. They are excellent for ringing bells and such like work, and promise well even for batteries for firing detonators and charges, under some circumstances.

The subject which next claims our attention is

DESIGN OF SHIP SHOWING THE ARRANGEMENT OF THE ELECTRICAL TELEGRAPHS.

Fig. 1.



Lieut. Fiske's Range Finder Indicator. O, O₁, O₂

Revolution Speed Indicator, E, E₁, G

H H Control Boxes for Revolution Indicators.

I I Contacts on Shafts for Revolution Indicators.

M Helm Indicator.

N Range Finding Instruments.

Fiske's Range Finder.

Range Telegraphs.

Engine Room Telegraphs.

Revolution Telegraphs.

Revolution Speed Indicators.

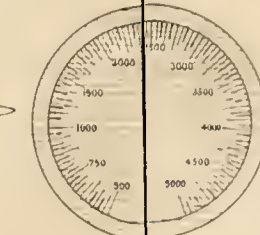
Helm Telegraphs.



Helm Telegraphs, L, K

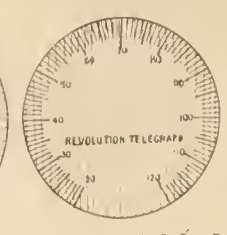


Helm Telegraphs, J

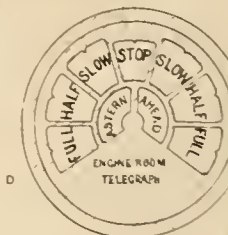


Range Telegraph Indicator or Transmitter.

P, P₁, P₂ Q, Q₁, Q₂

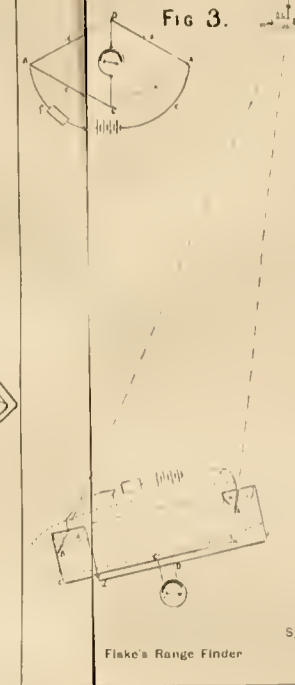


Revolution Telegraph, C, C₁, D, D₁



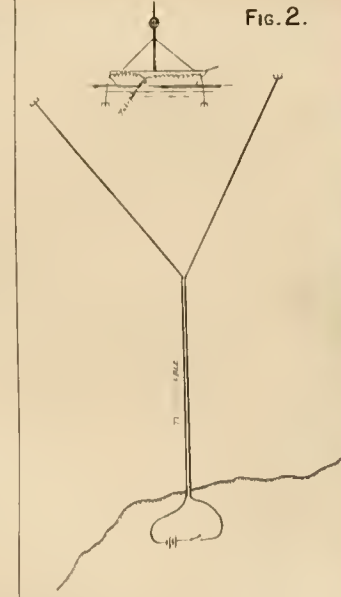
Engine Room Telegraph, A, A₁, B, B₁

Fig. 3.



Fiske's Range Finder

Fig. 2.

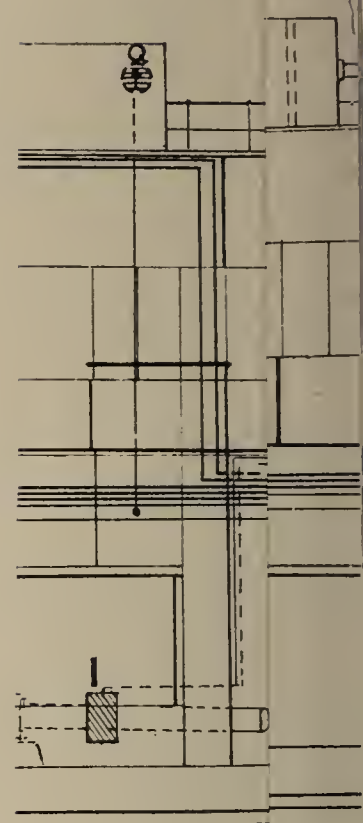


System for communicating with Light Ships and Light Houses

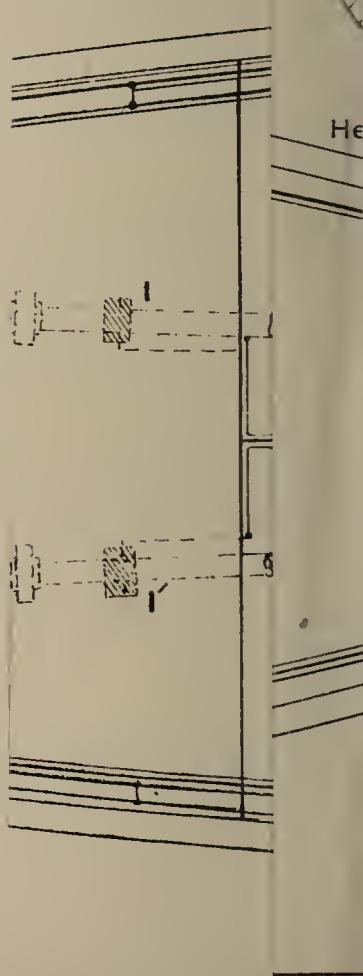
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- 1 Control Boxes
- 1 Contacts on St
- 1 Helm Indicator
- 1 Range Finding



Electric Communications.

Electricity lends itself to increasing the convenience and rapidity of communications to a very great extent, for signalling beyond the visual distance it is the only method, besides sound, and for short distances where the places between which it is desired to communicate are separated by walls or decks, or bulkheads, it is often the most handy method. In our modern ships of war, for instance, when it is desired to communicate between conning towers or bridges and the engine room, we find armoured bulkheads, watertight bulkheads, and all sorts of obstructions in the way, so if we wish to have one of the old fashioned telegraphs worked by rods we either have to lead the rods in exposed positions where they are liable to be shot away in action, or we have to make holes through watertight bulkheads, thus endangering their efficiency, or make so many angles and gearings that the telegraphs are almost useless on account of the friction and back lash in the working parts. For this purpose then electric telegraphs are peculiarly adapted; distance (within the possible limits of a ship) and angles make no difference, and if the wires connecting the instruments are severed by shot in action, they are easily repaired, whilst the rods of the mechanical telegraph could probably not be repaired without dockyard assistance. Different patterns of these electrical telegraphs have now been in use for some time; the difficulties to be overcome with regard to them are, first, the efficiency, under circumstances of sea service, of the batteries or other sources of electricity that work them, and, secondly, that they should indicate accurately at whatever speed the handle is moved, as however careful an Officer of the watch may be he will naturally push the engine room telegraph over with a jerk if he finds that his ship is just going to run into something. To get over the difficulty of the batteries, nearly every known source of electricity has been tried. The current required should be large, as the larger it is the less delicate the instruments need be; naturally, therefore, secondary batteries have been tried, but by reason of their delicacy and the care required in their use they are not altogether a success. Primary batteries, as being more easily repaired or replaced, have been more largely used, but it is difficult to get great power from them. It is also proposed to work telegraphs with the direct current from the dynamo machine; an instrument of this description has been invented by Mr. Richards, a Constructor in the Admiralty. It only takes half the amount of current necessary to light one lamp, and that only intermittently, whilst it is in actual motion; and as in our modern ships we have ample dynamo power, and always have steam to work it when under way, there seems to be no objection to using the dynamo as our source of electricity; this is, however, quite a new departure, and we have not yet got any practical experience of its working.

The machine that is at present most commonly in use is the Willis's, and the latest improvement of it, the Willis and Robinson's

telegraph. This instrument can be worked either by secondary or by primary batteries. The great point in its favour is that it cannot be thrown out of adjustment by being worked too rapidly, as the handle is not in direct connection with the electric mechanism. The fact of putting the handle over winds up, or extends or compresses a spring, which, in its turn, drives some clockwork; this makes the contacts; and no matter how angry or excited the Officer of the watch may be, the clockwork will only cause the contacts to be made at a certain slow and deliberate pace, quite fast enough for all practical purposes, but not so fast as to incur any danger of upsetting the adjustments. Another good point is that should this instrument show the wrong indication through the handle being worked when the battery is disconnected for any purpose, or through any other cause, it will readjust itself, simply by putting the handle hard over.

Instruments of this description are used for engine-room telegraphs, helm telegraphs and indicators, and for distance indicators to telegraph the distance of the enemy or target from the Officer taking the range to the guns. To prevent the possibility of mistakes, it is always advisable, in any instrument of this description, to have an answering dial, so that you can see that the man at the other end has received the correct signal.

A large ironclad now being built at the Forges et Chantiers de la Méditerranée is quite the most perfectly fitted ship, electrically speaking, that has ever been built; she has electricity for everything, and we shall have to refer to her more than once. Among other things she is to be fitted with a most elaborate system of telegraphs for all purposes (see Fig. I). Messrs. Elliott are now preparing the instruments; they consist of engine-room telegraphs, helm telegraphs and indicators, distance indicators and telegraphs, and revolution indicators. These last are very ingenious instruments, invented by Spratt. The fact of pressing a button on the side of the instrument clears off any former record, and starts the clockwork, which goes for fifteen seconds; on the screw shaft is an electrical contact that is made four times in each revolution, at each contact the instrument indicates one; so that, at the completion of the fifteen seconds, the number shown is the number of revolutions the engines are making per minute.

Whilst on the subject of telegraphs, it will not be out of place to consider the question of electric logs. A difficulty has always been, to keep the revolving contact watertight; this has now been got over in Granville's log, by making the log itself one plate of the battery for working the instrument, the iron hull of the ship the other plate, and the sea itself the exciting liquid, so that insulation is not required. It only remains therefore to decide what combination of metal with iron will give us the best result. Zinc gives a high electromotive force, but is not constant, as the sea water acting on the zinc oxidises it and the strength fails, necessitating constant cleaning. Plumbago gives the best results altogether, as it makes a cell strong enough to work one dial, and does not oxidise at all. If it is desired to use

more than one indicator, the difficulty is easily got over by making the small current from the log work a small and delicate relay, through which a powerful battery on board could be made to work as many instruments as you like. A combination of this instrument with a revolution indicator such as I have just described would enable you to read the speed at any minute by only pressing a button and waiting a few seconds until the counter had finished counting.

The telegraph for distant signalling of messages is of course now universal, and it is therefore very likely that in war-time men-of-war may have to use it under circumstances that will make it impossible for the proper operators to attend. This makes it necessary that a small body of seamen should be trained in the use of the instruments. For this purpose there is a school of telegraphy at Portsmouth; and certain ships are supplied with instruments, so that the men may be kept efficient.

Another use of the telegraph that we are hearing a good deal about at present is for communication with outlying lighthouses and lightships. There are two difficulties in the way: first, that of getting the wire on board the lightships that must of necessity swing to the wind or tide, or through the surf that is sure to be continually beating on the rocks round an outlying lighthouse.

Numerous watertight swivel contacts have been tried for the lightships, they are more or less satisfactory for a time, but they constantly break down; and as for the lighthouses, no shore end of cable has yet been made with a sufficiently heavy armouring to stand the action of a heavy surf on rocks for very long. A plan has, however, been patented by the Telegraph Construction and Maintenance Company, by which communication can be made to both lighthouses and lightships without the cable actually going on board them at all. The plan is this. A twin cable is led out from the shore to within about a quarter of a mile of the lighthouse or ship, the cores are then forked out, and end in large earth plates about one-quarter of a mile apart, one on either side of the place we want to telegraph to. Two earth plates are put overboard, one from either end of the lightship, or on either side of the lighthouse (see Fig. II). If now Morse signals are sent along the twin cable from the shore, using an interrupted current produced by a clockwork sounder, they can be distinctly heard in a telephone on board the lightship. This plan is now under trial, and, I am told, is likely to get over the difficulty of communication.

But the second difficulty is not so easily disposed of. At present lighthouses and lightships are supposed to be exempt from attack in war-time; but if we have telegraphs to them, it will be a sore temptation to use them as outlying signal stations for reporting the enemy's movements, and even if our morality is proof against the temptation, what enemy is going to give us credit for such correct behaviour? The result is, we should, as soon as war is declared, have either to remove them or protect them. The impossibility of protecting them is shown when I point out that there are over fifty round the coasts of the British Isles that an enemy might suppose to

be connected by telegraph, and that he would therefore be quite justified in destroying.

The telephone is not of much use in a man-of-war, as even in ordinary circumstances the noise of the engines, and the noises inseparable from having several men living together in a confined space, make it difficult to hear through; and in action it would of course be absolutely useless. It has also been given up by divers, as they prefer a voice tube, but it is of great use for running temporary lines for signalling during shore operations, or for keeping up communication between different parts of a mine-field, whilst laying mines for the defence of an anchorage.

Another way in which electricity helps us in signalling is by using either coloured or flashing electric lights. There is one system in which three lanterns are used, from which you can at will show either a red or white light. Thus if three lights are used together we can get eight combinations, and if two lights are used as well four more combinations may be obtained. These twelve would be quite sufficient for the few important signals that are required to be carried out quickly at night, such as large alterations of course, stopping engines, or starting. The system has also been largely extended, so as to make a complete code, by increasing the number of lanterns and using, in addition, indicator lights to point out the chapters of the signal book to which the number shown refers. In connection with this system, an Officer of the Austrian Navy has introduced an ingenious but somewhat elaborate switch, whereby the operator only has to set the number of the sign on a keyboard, turn the switch, and the proper signal is automatically shown.

Great difficulty has been found to make the flashing system work properly. There are two ways in which the flashes can be produced, first, by veiling the light, and, secondly, by extinguishing it; if a light is extinguished by a switch in the ordinary manner, you will notice that it takes a very long time for the carbon to cool down to blackness, and, being cold, it also takes a long time to warm up again to incandescence; the higher the candle power of the lamp, and, therefore, the thicker the carbon thread, the longer this takes. The result is, either the flashes have to be so slow that it is difficult to take in the signal, or they are all blurred together and it is impossible. Another difficulty is, that when the current carried through a switch is large, as it is in the case of lamps of high candle power, each break of the current causes a spark that in a short time burns up the switch.

Therefore, to get over these difficulties, several attempts have been made to produce the flash by veiling a light that is continuously burning; they have not been satisfactory, as the fact that the mechanism must be always exposed to bad weather and to violent alternations of heat and cold, renders a delicate instrument impossible; whilst, of course, a large and heavy instrument cannot be placed aloft where, for distant signalling, the flashing light is principally required.

We therefore have to fall back again on the extinguishing system

and try to get over the difficulties; this has been done very fairly successfully in the following manner:—So as to allow the carbons to cool quickly, instead of having one thick fibre, we have a number of thin ones; the lamp so made is called a multiple-fibred lamp; and, as a still further development of the same principle, we put each of the small fibres into a small lamp of its own. This improvement gives us two advantages, first, there is better ventilation and, therefore, more rapid cooling of the fibres; and, secondly, we get rid of the risk of one loop catching over another owing to vibration of the lamp. The incandescence is more rapidly obtained by having a resistance inserted in shunt with the key, which allows a small current to be constantly running through the lamp, not powerful enough to give any light, but only sufficient to keep the fibres at a very dull-red heat; this resistance also helps to get rid of the spark at the switch when turning the light off; and this object is further helped by having a condenser placed so that each coating is in connection with one side of the key. A light of this description, placed on the truck of a ship, is very useful for distant signalling, but does not, of course, have quite the range that the search light has when thrown up into the sky, especially when there are heavy clouds about that can be illuminated by the beam; this method, although slow, still remains the best for very distant work.

The next point on our programme is range-finding. Lieutenant Fiske, of the American Navy, has invented a very ingenious plan, by which electricity can be made to assist us in finding the range of a target or enemy's ship at sea.

The principle of the invention is, that we have two telescopes separated by as great a distance as we can conveniently obtain on board ship (see Fig. III). This distance, forming the base line for the calculation, should be as long as possible, so as to obtain accuracy. The telescopes are mounted on horizontal arcs, which are constructed with a thin wire imbedded in insulating material, running round the edge; attached to the telescope is a rubbing contact that touches this wire; the telescope pivots are joined together through a battery, and connections are made between the ends of the arcs so that the two portions of each on either side of the telescopes form the four arms of an electric balance, and between the arms of the balance is placed a galvanometer to indicate by its deflections when and to what extent the balance is disturbed.¹ Now, if these telescopes are moved along the horizontal arc, the resistance that the arc presents to the passage of the electric current is altered, but if the telescopes remain parallel, the resistance in both arcs is altered to the same extent, and the electric balance is undisturbed, and the galvanometer does not move from the zero point, but the telescopes are only parallel when the object to be observed is at an infinite distance. If, now, the object nears us, the telescopes begin to converge, and the nearer the object comes, the more the telescopes converge, and, therefore, the more the balance between the two resistances is disturbed, this causes a deflec-

¹ The lettering on the two diagrams in Fig. III will enable the reader to refer the connections to the graphic diagram of the balance and so make the principle clear.

tion of the galvanometer proportional to the disturbance of balance. If, now, we mark the galvanometer to correspond with the distance due to the different angles of convergence of the telescopes, we have at once a direct-reading range-finder. This description is not scientifically accurate, as it omits two errors which are so regulated as to eliminate one another, but it is sufficiently accurate to show the principle. This instrument is said to give great satisfaction on board the American cruiser "Baltimore," to which it has been fitted; it has also been fitted up on board the ironclad building in France, to which I referred above, in which ship there are three pairs of instruments, viz., one pair on each broadside in small sponsons about 300 feet apart, and one pair on the fore-bridge, with a base between them of between 50 and 60 feet, for taking ranges right ahead or right astern. These latter instruments are rather differently constructed to the others, as, owing to the short base, they have to be more delicately adjusted, and they do not admit of a training of more than 5 or 6 degrees on either bow. The galvanometers for showing the distances are placed in the electric room, a place in the centre of the ship set apart for the testing and management of all the electric circuits in the ship; in which room the ship's electrician and his staff would be stationed in action. They would read off the distances from the galvanometer and instantly telegraph them to the different guns by Willis's distance indicators.

We will now consider the application of electricity to motors. Their use for various purposes has increased very largely of late years, and they are a great convenience, owing to the ease with which the power is conveyed to them (wires being all that is required), and to the portability of the machine itself whilst working. An example of their portability is the electric drilling machine now largely used in the construction of iron ships.

Where power has to be distributed by the agency of steam or hydraulics, somewhat elaborate fittings in the way of pipes have to be placed, that are not only cumbersome in themselves, but, and this is a serious objection in a modern iron ship, they necessitate piercing the watertight bulkheads; whereas, if electricity is used, the wires can be led through the bulkheads in such a manner as to leave their watertightness still intact.

The objections to the use of electricity are, however, very serious. First, there is an enormous loss of power due to the change of form in which that power is applied, *i.e.*, commencing with steam or heat which is our primary motive power, we change it into electricity through the medium of a dynamo, then back into mechanical work through the medium of the motor. The second objection is that to develop the power of a motor great speed is necessary; therefore gearing is wanted to reduce this speed to whatever our requirements may be, and of course the use of gearing means a further great loss of power. Thus electricity is a very extravagant way of applying force.

For working guns in ships, where we require to apply our power at many different points, steam is, of course, disadvantageous, as the

trouble of leading steam about the ship and keeping the joints always tight, and the inconvenience attached to getting rid of the waste steam, renders its use almost prohibitive, and another method of transmitting power becomes necessary. The means usually adopted are hydraulics, and in point of economy there is no doubt that it is far the best, for one great reason, that it can be applied direct to the work it has to do without the intervention of gearing.

Nevertheless in one or two American ships and in this new ironclad we have already mentioned as building at the Forges et Chantiers electricity has been adopted, I presume on account of the quality I mentioned above, viz., that it lends itself to facilitating the transmission of power through watertight bulkheads without impairing their usefulness, and also to the fact that the wires are so much easier to repair if damaged in action than pipes.

This vessel is armed with four 24-cm. guns mounted *en barbette*, one forward, one aft, and one on each broadside, and also four pairs of 12-cm. Q.F. guns on twin mountings, the ammunition supply being between them. The larger guns are both trained and supplied with ammunition by electricity, whilst the smaller guns have only electrical ammunition supply. For training the 24-cm. guns, two motors are supplied to each, one being spare; the motor revolves a sprocket wheel by means of a worm and wheel; this sprocket wheel gears into an endless pitch chain which encircles the trunk of the mounting, itself an integral part of the revolving platform. This trunk also forms the ammunition lift, and the ammunition is hoisted through it by another endless pitch chain actuated by a smaller motor. The ammunition hoists at the smaller guns are worked in a similar manner. All the motors are therefore well down below, and are, in fact, under the armoured deck, and in most cases, if not all, they are near steam engines, so it is difficult to see what advantage is gained, as the steam itself might have been used, but I believe the electricity is a duplication of power. The electricity in this case is produced by two very large dynamos driven by engines that appear to be of about 40 horse power.

Motors are also used for driving launches and other small boats. Here again we have a most extravagant form of propulsion, more extravagant even than the motors we have just been considering for manipulating guns, as in this case we have to make one more change, *i.e.*, here we change our steam into mechanical work for driving the dynamo, then into electricity, which is again changed into a chemical form when charging the secondary batteries, then again into electricity, and again back to mechanical work through the motor. Each of these changes means a waste of power amounting in the aggregate to nearly half the power originally developed by the steam engine.

Another disadvantage of this form of propulsion is the enormous weight of the secondary cells; so great is this weight, that high speed is an impossibility in an electric boat containing its own accumulators. In fact I think I shall be within the mark if I say that no boat of this description has ever exceeded 9 miles

an hour; the speed is reduced not only by the enormous weight the boat has to carry, but also by the fact that, the motor revolving at a high speed, the propeller has to be of short pitch; consequently the percentage slip is increased, as also is the skin friction of the propeller itself.

Against these disadvantages we have, when we are dealing with vessels for pleasure purposes, absolute luxury and comfort, as there is no heat, or smell, or dirt, and little or no noise, and for war purposes we are enabled to have a boat driven silently, and without a chance of sparks or smoke to betray her advance to the enemy, therefore probably most useful for torpedo work.

It will, perhaps, be of interest if I describe a boat of each of these types recently constructed by the Electric Power and Traction Company at their works on the Thames, near Hampton.

The pleasure vessel is a river yacht 55 feet long over all, and 8 feet 6 inches beam; she carries 3 tons of accumulators and machinery consisting of 100 accumulators of the B 15 type, having an output of 150 ampère hours; these cells can be fully charged in 5 hours, and at the full speed at which the boat is driven they discharge in 7 hours; this gives a speed of 7 or 8 miles an hour, and develops about 5 horse power. A switch close to the steering wheel is so arranged that you can go full or half speed ahead or astern, the difference in speed being obtained by, in the case of full speed, arranging the cells 50 in series and 2 in parallel; and in the case of half speed, 25 in series and 4 in parallel; the half speed is about 5 knots. The propeller makes between 700 and 800 revolutions a minute, its pitch being 16 inches and diameter 20 inches. All the accumulators and the motor are either in lockers forming seats, or under the bottom boards, so that the whole of the boat is available for accommodation.

The boat that is presumed to be for war purposes is similar to one that was at the Naval Exhibition. She is a clinker built boat like a large gig 40 feet long; she contains $2\frac{1}{2}$ tons of accumulators and machinery, and weighs about 4 tons without warlike fittings; she is to be hoisted up on board a ship. She has 60 cells, which are used all in series at full speed giving an output of 40 ampères for 4 hours and a speed of 8 miles. Two of these boats have been recently sold by this Company to the Russian Government. For the purpose of comparing these boats with steam launches, it is perhaps fairest to take the 32-foot Naval Service steam cutter. In this boat with a weight of boiler and machinery (with steam up) of $1\frac{3}{4}$ tons, we get a speed of about 10 miles. There are, however, two points of advantage in the electrical boat over the steamboat that we have not yet noticed: first, that in the former we do not require to carry any extra weight, such as coal and fresh water to keep the engines going, and, secondly, that we can stow the weights in the electric boat to better advantage than in the steamboat, as it does not matter where the batteries are placed, so long as they are in the boat; therefore, as they need not be high, we are enabled to build a boat of deeper keel and consequently finer lines. This advantage does not seem to have

been made full use of yet; when it is, perhaps we may get rather better comparative results between the two modes of propulsion.

We must now pass for a few moments to the question of firing guns by electricity. We have been in the habit of using what is termed a "detector," that is, a galvanometer, so that we can see at any time if the circuit is complete. An improvement on this has been recently introduced by which, instead of seeing, we can hear if the circuit is correct by substituting a sounder for the detector. This instrument has been brought out by Messrs. Armstrong.

Whilst on the subject of guns, I may as well also mention night sights, or a plan for illuminating the sights at night so that aiming is made much easier. As an example, I will take those patented by Captain Grenfell, which consist of two very small incandescent lamps, the current for which is obtained from small primary or secondary cells. The lights themselves are screened from the eye, but throw their light on inclined bars which form the sights. A switch is introduced between the battery and the light, with a resistance in it, so that the brilliancy of the light can be regulated to suit different conditions of atmosphere. These sights will probably very much increase the accuracy of night firing.

The last subject we have to deal with is torpedoes, not because it is least important in this connection, as it practically was brought into being by electricity and exists by it; there is, however, not much that is new to be said. I do not mean to say that as great an advance has not been made in this subject as in others; but this advancement is more in the nature of detail, that it would be impossible to go into in a short sketch like this, and there is very little involving new principles.

As regards submarine mines, the only point we need notice is mechanical mines, or those that carry their means of ignition within themselves, and therefore require no cables. They have been brought more into prominence of late, owing to the notion having been started of using them for what is termed "Torpedo Blockade," that is, for dropping in front of an enemy's harbour to blow his ships up should he attempt to come out. I have often heard it said that we never require to bottle up an enemy into his ports, we want him at sea. Although I hope that may be true, I don't think it can be denied that a very short search into history will show us many cases in which we should have been glad to have the power of worrying our enemy in this way; at any rate mines of this description would be very fair substitutes for cruisers watching a narrow channel when the cruisers themselves are not obtainable.

To be efficient they must be provided with an automatic mooring apparatus that will moor the mine at any required depth from the surface without the necessity of previously taking soundings.

With regard to torpedoes proper, that is, mobile charges as distinguished from stationary charges or mines, electricity is still used both as a means of steering torpedoes and also propelling them. For propelling them, as one might expect from what we have seen of the difficulties of electric boats, the source of electricity cannot be con-

tained in the torpedo itself, with any hope of attaining a high speed. We have, therefore, to fall back on the plan of having a cable between the torpedo and the source of power, for conveying the electric current to it. The most successful torpedo of this type is the Sims-Edison, which has been going now for some years; it was fully described in Commander Batten's lecture in 1885, and since then it cannot be said to have improved very much, but its speed and range have increased, and it is so far serviceable that it will undoubtedly be used in war by some nations.

Attempts have been made lately to use it from ships under way, and there is no doubt that, so far as the machinery that it is necessary to carry is concerned, it can perfectly be done. But its proper sphere of usefulness is undoubtedly as an auxiliary to harbour defence. The difficulty with it will, I am afraid, always be the cable, for this reason. Electrical power can be obtained in two ways: we can either have high electromotive force and small current, or low electromotive force and large current. Either combination will give the same result; just as in the use of water, a high pressure and small quantity can be made to do the same work as a low pressure and large quantity. Now, if the electrical current running through the cable to the motor in the torpedo is very large, the cable must be large and heavy; and the torpedo itself, which has to hold the cable that is to be paid out, must also be large, so as to be able to carry the weight. It is a great advantage, therefore, to reduce the current and increase the electromotive force, but we then come face to face with another difficulty, that if we have high electromotive force, we must have extra good insulation on the cable conveying the electricity, as a leak in the insulation will be immediately fatal to the working of the motor.

Therefore we want to hit off a mean that, whilst giving us a small current and therefore light conductor, will not unduly increase the electromotive force beyond what the insulation of a flexible and light cable is able to stand; in the end it will probably be found that the users of this torpedo will have to rest satisfied with a cable that will be efficient for one or two runs of the torpedo only, but will not stand more use than that. This, of course, means extra expense, a small matter in war-time.

Captain EARDLEY-WILMOT, R.N.: Your Royal Highness, ladies and gentlemen, I was quite sure that we should have a very excellent paper from Lieutenant Hamilton on a subject to which I have paid some attention, and what we have heard has quite come up to my expectations. He truly says "the more practical experience we get the more we see that electricity for naval purposes must be applied in such a manner that the instruments and machines used must be simple." One point also which it is desirable to bring out with regard to the internal electric lighting of ships is this, that however pleasant it may be, and no doubt it is, especially in hot climates, there must always be the danger in action of the wires being shot away, and the ship being thrown into darkness at a critical moment. Therefore, although we may, perhaps, rely upon electricity for lighting the ship below the water-line, all the parts above the water-line certainly should have a duplicate system of candles or oil lamps. I could have wished the reader of the paper had given us a few practical illustrations of the uses to which these electrical machines

had been put, and I may, perhaps, be allowed to mention one or two instances where we have used electricity with very useful effect. He alluded to the search lights and signalling. A few years ago, when we were employed in an operation which political circumstances compelled, viz., the blockade of the coast of Greece, in which your Royal Highness commanded, we had a large number of ships distributed over a large area, and they had to be more or less in communication. In the ship I commanded we had a powerful electric light, and I was enabled to keep up communication with my senior Officer at a distance of 20 miles by pointing the search light in the sky, observing it, and allowing it to flash forth again by means of a shutter, as now used, with an ordinary lantern for short distances. Practically we are better off for distant signalling by night than we are by day. There is one thing, of course, to be remembered, that the electric search light is practically useless in foggy or misty weather. The electric light can, however, be used for different purposes, and I will mention one instance where we found it exceedingly useful. When we were in the Red Sea in 1885 we had a powerful electric light on board. An expedition used to start off in the early morning, and had to be supplied with water. At that time every drop of water had to be distilled in steamers and collected in tanks. It was then put into skins and carried by camels. The expeditions used to start off early in the morning, and it was necessary that the skins should be filled during the night. So we arranged a series of lights on shore, composed of small incandescent lamps, which were worked from the ships' dynamos, through a cable laid to the shore. By that means the whole of the tanks were lit up, and the proceedings were carried on with great expedition and efficiency. The next thing was to place the skins on the camels' backs. The camels were brought to within a few hundred yards of where this was going on, and were made to lie down. There were a large number of them waiting to be loaded. The next thing was that there should be light in order to carry this into effect. I then utilized the search light, which was turned on the camels with a diverging lens, which enabled the rays to spread over a considerable distance, and reduced the brilliancy of the light. It was a curious thing to see the effect on the animals. At first we thought they would start up in fright and be off, but the only thing was that every camel turned its head to where the light came from. At 4 or 5 o'clock in the morning, being all loaded, they marched off. That is a practical illustration of what can be done with the electric light other than for the purposes to which the lecturer has referred. As regards the range-finder described by the lecturer, I think it hardly applicable to a ship of war at sea, under the varying conditions of action. In the first place two observers are required: they must be at different ends of the ship, and in communication with each other. Telephones will not answer when there are guns going off; I think we want something simpler than that, by which the distance can be ascertained by a single person and communicated to the guns. Certainly we have had a very instructive lecture on many interesting subjects.

Admiral COLOMB: I am quite incapable, your Royal Highness and gentlemen, of discussing the paper, but when we come here it is a sort of duty that devolves upon us to endeavour to start a discussion. That has been already well started, but there seems a little hesitancy in following it up: therefore, I rise to congratulate my old shipmate on the lecture, which I have most thoroughly enjoyed. I only wish that I knew something more about the subject, so that I could further enter into it. But I have a little sensation of feeling, after hearing the lecture, that I am rather glad, upon the whole, that I am out of it, because the thing is evidently getting serious, and what one feels about it is that, possibly, if warfare is going to be made off into electricity, it may be a good thing. The only part I am at all capable of appreciating is that part which referred to signalling, and I must say I am pleased to see that there is a possibility of at last getting moderately rapid flashes from a high point in the ship. That apparatus seems to answer very well, but not perfectly, because I am sure, if flashing signals are to be perfect, as they ought to be, something still more rapid than that has to be arranged. I have been much struck watching flashing signals in the Army. I believe that they are further advanced than we are in that part of the science—that their signalling is more correct and quicker than ours. They have the advantage in the Army of having

no other system competing, and some of our competing systems undoubtedly interfere with the flashing system by restricting practice. It is evident that we are going on in the right track, and that results will be ultimately obtained which will be satisfactory to everybody. I beg to congratulate the lecturer heartily on his paper.

Admiral LONG: Your Royal Highness, ladies and gentlemen. Though I am by no means competent to criticize the admirable lecture we have heard, I do not like to remain silent, seeing that Lieutenant Hamilton has taken so much pains, and has got so many beautiful instruments here to instruct us. One lesson we must all learn from the progress of electricity in the Navy, is the advantage of steady, persistent application to one object. It certainly is most wonderful to me to see the progress that has been made in the practical application of electricity to naval things since I first went through the torpedo course in the year 1869. Matters were then in a very different state to what they are now, and I think we cannot but admire the pertinacity, the ability and zeal, with which Officers have stuck to it since then, and have now brought about a state of affairs in which, I believe, we are second to no nation in Europe. There are only one or two points upon which I might make a remark as to communication with lightships. It may not be generally known, that so long ago as 1887, there was a lightship, the "Sunk," in communication with the land by a cable, which passed up through the mooring swivel centre, which was made hollow; it was found very satisfactory. During the manœuvres I was in the Downs: we used to receive telegrams from this lightship, telling us whether any enemy was in sight, and there was no failure at any time. With regard to the three-light signal system, I should like very much to ask Lieutenant Hamilton whether we have that system in use in any ship in the Navy. I think there is a system called the Conz, and also that of Kaselowski, but whether it has been tried in our Service I am not aware. Also with regard to the secondary cells: I should like to ask whether the motion of the boat at sea is found to injure their permanency, whether they are found to wear out more rapidly when used for that purpose than when used on shore. There is no doubt an electrically-propelled boat is a most admirable thing for the use of torpedoes. It may be remembered, perhaps, that on one occasion an electrically-propelled boat went across the Channel, and its progress was so silent that they actually caught a sea-gull floating on the water. That is certainly a point of great importance in torpedo warfare. In Portsmouth Harbour it was quite curious to see how silently the electrically-propelled boat rushed along. The want of speed, I think, is no defect for that purpose, because any boat or vessel going at high speed causes such a disturbance that it becomes at once conspicuous. There is one application that, perhaps, might be made of the motor—I do not know whether it ever has been done, but it struck me it might be a useful way of driving fans for ventilation in out of the way places. Our ships now are full of holes and corners which need ventilation very much sometimes, and I think it possible that the application of electricity might be found to be useful. I do not know that there is anything else which I can say with advantage on this paper. I think Lieutenant Hamilton, as we knew he would do, has treated the subject very fully and very ably, and I congratulate him very much.

Commander MERRYON, R.N.: Your Royal Highness and gentlemen, with reference to some remarks which fell from Admiral Colomb about the Navy being behind the Army as regards the rapidity of signalling, I should like to draw attention to the fact that the conditions of our signalling are entirely different from those of the military. We do not spell out long messages word by word, as is done by the sister Service. We have a code, and it is quite possible for us to do efficiently all our signalling work much slower than is necessary for the land Service. Our distance signals are generally signals referring to our codes, and can be made slowly, carefully, and taken in with certainty. We do not attempt to spell out long messages in which rapidity is of very great importance. Having had something to do with the preparation of the electric flashing-signal light apparatus which Lieutenant Hamilton has shown you, I may state that a great many other systems were eliminated before that was brought out. Our distant night signalling refers to distances of 15 or 20 miles. The Army night limelight signal apparatus, which I think Admiral Colomb was referring to as being so

rapid, is only used at a distance of 2 or 3 miles. Of course the military day system of the heliograph is very rapid, and is capable of being used at long distances. For our daytime long-distance signals we have to depend upon inferior methods, because we cannot get the steadiness of platform necessary for the heliograph; but for night long-distance signalling the comparative slowness is really no great objection to our system, because we are generally using a code and not spelling out words.

H.R.H. the DUKE OF EDINBURGH: I think it is the duty of the Chairman to bring a discussion on a paper to an end. My task is made a very easy one by the admirable paper which we have had before us, and which has left very little open to criticism, as has been clearly shown by the very small number of competitors who have come in to offer suggestions of their own. I can only point out one little omission in the lecturer's paper, which is, that whilst he mentioned the work which is being done at Portsmouth with regard to these matters, he overlooked the fact that there is a port rather further west from which I hailed yesterday. The instruments which you have seen are most interesting, and they are of course immensely in advance of anything we had before. I cannot at the same time help feeling that if we are to trust entirely to electrical communication, and to everything being worked by electricity in a ship in time of action, we shall stand at a great deal of risk. Of course, there is the great difficulty of getting from one part of a ship to another, and communicating, as the lecturer has pointed out, through these bulkheads and armoured decks, and so on; but it is to be hoped means will be found that we shall not have to trust entirely to one single wire, which after all may go wrong. Admiral Long expressed the hope that there would be other applications of electricity, for instance, to the purposes of ventilation. I may mention to him that I saw most admirable little electric fans last year in the Emperor of Russia's new yacht then at Falmouth, which were fitted in all the lower parts of the ship, which had no scuttles. These fans when worked gave a most beautiful current of air; but they had the great drawback of being rather noisy, and I expect a good many people who wanted to sleep would feel inclined to turn off the fans and do without the fresh air. I do not think I am sufficiently an expert to discuss any of the details into which the lecturer has entered. I will therefore conclude this discussion by tendering him our warmest thanks for his most interesting and instructive lecture.

Lieutenant F. T. HAMILTON: The only point, your Royal Highness, in the discussion which I think requires a word from me is that raised by Captain Eardley-Wilmot. I do not think I made it quite clear as to the range-finder for right-ahead work. This ship to which I have been alluding has range-finders for that purpose. They have a 50-feet base line across the bridge, and the instrument, instead of having a wire running round the arc, has it wound on a coil, so that a very slight motion of the telescope will give a large motion of the rubbing contact on the wire. With the instrument so modified you can get the range with accuracy up to 4° or 5° of training on each bow. With regard to the explanation not being mathematically correct, I think I confessed that in the lecture. The mathematical errors in my explanation are two in number, which are made to eliminate one another by the adjustment of a resistance in the galvanometer itself.

Captain EARDLEY-WILMOT: I did not mean your explanation: I meant the instrument was not mathematically correct.

Lieutenant HAMILTON: I think you will find that it is made so with this correction. With regard to the three lights which Admiral Long spoke of, that system has been in use in the flagship in the Channel for some three or four years. They rigged it up themselves in the "Northumberland" originally, and it was afterwards used in the Mediterranean. They found it, I believe, most useful for alterations of course at night and that sort of thing. With regard to the motion of the boat injuring the secondary cells, there is no doubt it does. It must shorten their lives to a certain extent, but there is very little experience of them in any places where the boats knock about at all. The principal place where electric boats have been used up to now, is on the Thames as pleasure boats, and there I do not know that they find very much difficulty. With regard to the fans Admiral Long spoke of, in addition to those mentioned by your Royal Highness, they have one on board

the "Royal Sovereign," fitted up as an experiment by a firm of the name of Blackman and Co. I regret having omitted to mention the Telegraph School at Devonport.

Field-Marshal Sir F. LINTORN A. SIMMONS, G.C.B., G.C.M.G. : We owe a debt of thanks to His Royal Highness for coming to preside at this meeting, where we have heard such an exceedingly interesting lecture delivered by Lieutenant Hamilton. The remarks of His Royal Highness are quite sufficient to show that he highly appreciates the value of electricity as applied in ships-of-war and to war purposes. Having served in the Mediterranean when His Royal Highness commanded the fleet on that station, it was a source of great gratification to me always to see that fleet maintained in the highest order and in the most perfect condition, and to know that every encouragement was given to Officers to develop any project that might be beneficial to the Service of which he is so great an ornament. I ask you to offer your sincere thanks to His Royal Highness for presiding on this occasion.

Admiral Sir E. FANSHAWE : I beg leave to second that.

(The resolution was carried by acclamation.)

H.R.H. the DUKE OF EDINBURGH : I beg to thank you and to assure you it has been a great pleasure to me to be present.

Friday, May 6, 1892.

LIEUTENANT-GENERAL E. H. CLIVE, p.s.c., Governor and Commandant,
Royal Military College, Sandhurst, in the Chair.

MILITARY EDUCATION.

By Colonel F. J. GRAVES, h.p., late 20th Hussars.

THE increased application of science to military matters, resulting in the invention and production of weapons of precision of enormous powers of velocity, range, accuracy, and destructiveness, has necessarily increased the need for a more extended and closer study of the art of organizing and leading the huge masses thus armed, so that they may be brought into contact with their opponents at the right time, in proper condition, in such a position, so distributed, and in such overwhelming force that victory will be assured.

To insure victory in the face of smokeless powder and arms of such deadly effect will require on the part of leaders and commanders a developed intelligence, a military knowledge and experience, such as were not thought of in the days of the bow and arrow, flint-lock musket, or obsolete rifle.

No amount of courage, dash, &c., will compensate for incapacity, inexperience, or want of science. This developed intelligence, knowledge, and experience must be based on, and be the outcome of, a sound military education.

The highly educated man, in a military sense, is not, to my mind, a man who has been taught a great variety of subjects, and whose mind is stored with varied knowledge. No; the highly educated man is the man whose mind, being stored with useful information and knowledge, is also trained to apply them at the right time and in such a way as to produce the best effect at the smallest possible cost.

I propose, then, with your permission, to consider the subject of military education from two points of view:—

- I. Education *for* the Army.
- II. Education *in* the Army.

I commence with the question, When should education *for* the Army begin? And I reply, certainly not at the Royal Military Col-

lege or the Royal Military Academy; again, certainly not a few months before the time for the examination for entrance to these places. This is too late. I think it may be truthfully asserted that one cause of some Officers being passed over for promotion, owing to their having failed in their examination for the same, is that they began their military education too late. Further, that their education, before their or their parents' decision that the Army should be their profession, was carried on on too general lines.

The earlier a youth's future profession is chosen the better for him, and the more hopeful will be his prospects of success should he be suited for it. Delay in this matter is too often fatal. Then the youth's education should be carried out with a view to the special calling in life chosen. A general education, or, say, one calculated to secure an ordinary "pass" degree at Oxford, Cambridge, or Dublin, would be unsuited for a youth going into the Army.

Education *for* the Army should be special, and only those subjects should be taken up that will prove useful afterwards *in* the Army.

Colonel Tulloch, in his excellent paper on the "Battle Training of Regimental Officers," makes the following comparison between naval and military men. He said, "No one can accuse Naval Officers of being mere bookworms, or of caring less about sport when on shore than ourselves; but, somehow, their profession seems to be far more deeply ingrained in their nature than with us. Cannot we soldiers take a leaf out of the naval book and work at our trade as our blue-jacket brothers do? In the Navy such a thing as a young Officer really ignorant of his profession is unknown. Can the same be said of us?"

If this comparison, so much in favour of the Navy, is correct, and it may be, I am convinced that I can give a solvent reason for it. It is because the naval profession is chosen so very early in life, and, further, because the education from early youth has very special reference to the naval life and work in the future.

Permit me now to present two notable examples in furtherance of my argument. First, as to the early choice of the military profession. Sir Charles Napier, when but twelve years old, was appointed to the 33rd Regiment, and shortly afterwards was transferred to the 89th, at Netley Camp, where his father was A.Q.M. General; "and the boy was taken there; thus, without joining his regiment, he was early initiated in the ways of soldiers, by which his natural genius for war was quickened. When the camp broke up for foreign service, he was sent back to Ireland, and exchanged into the 4th Regiment; but, instead of joining, was placed with his brother as a day scholar at a large seminary at Celbridge;" what he had learnt at Netley soon brought forth fruit, as "Charles Napier proposed to organize his schoolfellows as a volunteer corps." This was done, and, young as he was, he was made captain, and commanded in such a way as to shadow forth the fame he afterwards attained to. He began his actual military duties at seventeen years of age as A.D.C. to Sir James Duff.

I now shall quote a case supporting my contention in favour of an early special education as opposed to the too common general education.

In Wright's "Life and Campaigns of Wellington," we read that his mother, Lady Mornington, "sent her son Arthur to Eton.

. . . The system of education at that classical institution was not suited to the genius of the infant Hercules, and after a brief struggle with the heroes and poets of antiquity, he was removed.

. . . With that decision and energy, which she seems to have left as an inheritance to her noble children, Lady Mornington removed her least-lettered son to the Military College of Angers, in the department of Maine et Loire, where he studied fortification and the art of war under Pignerol, the best military engineer then living. . . . This school was wisely selected. . . . That

Arthur Wellesley, the conqueror of Napoleon, should have passed through the forms of Eton without distinction, need not excite surprise or regret. . . . The young soldier soon perceived that Eton was not a field for the exercise of a mind possessing scientific powers only, and capable of being stored with all the theoretic learning of a military school, a description of academy which England at that period did not possess."

Well, the Duke was appointed Ensign in the 73rd on March 7th, 1787, when between seventeen and eighteen years old.

In the Duke's case, what if the "struggle with the heroes and poets of antiquity" had not been "brief," but had been continued to the bitter end, *i.e.*, to the date of his appointment in the Army? Would he have made the mark on history he did?

I do not contend that the foregoing cases prove the necessity of early military education, but I think they prove the great advantage of it, and afford considerable encouragement in that direction.

Of course this matter is mainly under the control of parents, and if they, generally speaking, would look upon the Army as a serious profession, and not as a means of their boys "seeing the world," "passing their time," or obtaining social position, it would be beneficial to the boy, the Army, and the country.

In considering the preliminary education of a boy, it would seem that the three principal means are, instruction by a private tutor, a school, or a special army tutor, often improperly called a "crammer."

With regard to the first, its advantages are, that the boy obtains constant individual and undivided attention, and that he has the sole claim on the assistance of his instructor; its disadvantages are, that the boy so educated often turns out a bit "soft," as he has never had to fight his way among those of his own age, and that few really first-class men, capable of imparting a sound education in the necessary subjects, are to be found who would be satisfied with the pecuniary results of such an occupation. I think the proportion of Officers in the Army who have entered direct from the hands of a distinctly private tutor must be very small.

On the other hand, large numbers have and still do enter military life from our public schools.

Now, the choice of a school is no easy matter. Some parents affect certain schools because "so many of their name have been there ; others think such and such a school has a "crack name;" others because they want their boy to be introduced into a "good set," and so on. I think the main points to be considered are: first, what career the boy is intended for; secondly, what establishment, by its character and results, promises best to launch the boy in that particular career with the greatest prospects of success.

In my humble opinion, the weak point in our public school system in the past was, that as far as preparation for the Army is concerned the education imparted was of too general a character in some cases and too classified in others. The heads of many of our large schools have of recent years been waking up to this fact, and have instituted special classes for Army candidates, in which only those subjects are taught that are necessary for the examinations.

This is a move in the right direction, but it should be borne in mind, that the smaller these classes are kept within reason, and the more individual attention that is given the pupils, the greater will be the resulting success.

It was the fact of the point of weakness that I have referred to that called into existence that body of specialists commonly, but, I think, improperly, called "crammers." This body of men are simply special Army tutors; the great majority have served as Officers in the Army; very many of them are Staff College graduates, and many have done good work on the Educational Staff while serving.

Their establishments range from the "two or three boys received, &c.," to those of fifty or one hundred or more pupils. They exist for the special purpose of passing young men into the Army and of preparing Officers for promotion and entrance to the Staff College.

A certain writer in a recent issue of the "United Service Magazine," who possibly held a brief on behalf of the public schools, or was possibly an assistant master at one of them, brought a number of charges against the general body of Army tutors: he says, in substance, that they are insincere, they only try to make money, they are regardless of the character of their pupils, they will not expel a clever though bad boy, they cannot maintain discipline, that their pupils do not turn out gentlemen. Of their assistant instructors, he says they may be "ill-bred, ill-mannered, and unrefined," and their "physical calibre that of a city clerk"—a tolerably strong indictment!

Now I hold no brief on behalf of the Army tutor: I passed from school, I obtained my promotion without going to an Army tutor, but I emphatically assert that a more "ill-bred," "ill-mannered," untruthful libel upon an honourable body of men could hardly be conceived, and the writer richly deserved the severe public castigation he has received from the pens of several of that body.

There are at this moment many hundreds of Officers serving the Queen who owe their entrance to the Army to the educational help of these gentlemen. Hundreds of boys are taken from schools to finish their education for the Army at the so-called "crammer's."

Do you often, or ever, hear of boys being taken from the Army tutor's to finish their education for the Army at any of our public schools?

Numbers of instructors at Army tutors' are yearly accepted by public schools because of their special powers of instruction. Five passed in this way from one establishment. Do we often hear of the opposite?

I consider the Army owes a great deal to the Army tutor, a class mostly made up of retired Officers, who have brought their military experience to bear in supplying a felt want, and if the school heads desire to regain some of the ground they undoubtedly have lost in the direction of military education, they had better take a leaf out of the book of the Army tutor.

Specialism, if I may use the term, should be the key-note of education for the Army: for numbers of boys who are sent to school receive a general education for years perhaps; then it is suddenly decided to put them into the Service. Two-thirds of the course of their education has to be altered; some subjects are dropped and others substituted; the boy does not seem to get on as he did; the time for examination draws near; competition is keen; what is to be done? "Oh! send him to a crammer." To the crammer he goes, and it is too often found that the lad has been ill-grounded, half-informed, knows more of the rules of cricket and football than of the rules of grammar and arithmetic, and that the subjects he does know something of have been imparted to him from a point of view different from that usually taken by a military examiner.

The old-fashioned way of deciding upon which "form" a boy should be placed in on going to school was somewhat this: his age was considered, then he was tested to see how far he had got in Latin grammar, mathematics, &c., &c., whereupon he was told off to a certain form. This may be right and necessary in very early youth, before a boy's future has been decided on; but when this has been settled he should be placed in a class with others working for the same end.

Let us now pass on to the channels through which the Army is entered: these are four in number, the Royal Military Academy, the Royal Military College, the Militia, and through the ranks.

In old days it was much more difficult to obtain an entrance to Woolwich Academy than it was to get into Sandhurst Military College. The examination was more difficult. Now many believe it to be more difficult to pass into Sandhurst, not so much because of any change in the general character of the examinations, but because of the very greatly increased competition for Sandhurst. This is of no very recent growth, for, according to Captain James, a well-known Army tutor, ten years ago the candidates for entrance to Sandhurst were in the proportion of eight to one vacancy, and for Woolwich but three to one. I believe that now the proportion against Sandhurst is even greater. With regard to the course of study at Woolwich, I have nothing to say; it appears to give general satisfaction to the authorities who have to judge of its merits. I would simply say that

if Permanent and Field Fortification are necessarily the principal subjects, Tactics should come next in importance.

At Sandhurst I think tactics and the study of ground and country, both out of doors and on models and maps, should have a more prominent place, and more time given to them.

I heartily endorse the opinions expressed here by Sir Beauchamp Walker and Captain James regarding text books and their use. The science of war advances, the circumstances of war change, and the weapons of war improve rapidly and suddenly, but not so with text books. There are such books in common use even now, some parts of which are already obsolete.

Entrance through the Militia has these advantages, that men who decide on the profession of arms too late to go to Sandhurst can do so thus. They have to pass a literary and military examination, and do duty for some six months with a Militia regiment first. Many also obtain certificates at the Schools for Auxiliary Forces. The military examination for Militia candidates is similar to, but somewhat harder than, the final at Sandhurst. The competition for vacancies is keener.

Entrance through the Militia must not, then, be considered a "back door" way of getting into the Army. The Militia candidate is just as good an Officer, generally speaking, as the man who has entered through Sandhurst.

Entrance through the "ranks" entails the obtaining a first-class certificate of education under Army education rules, or having passed one or other of the recognized tests beforehand, together with the necessary recommendations from the Officer Commanding. This channel applies to such a small proportion of men that it calls for no special remark.

Before passing on to the second head of my paper I should like to say a few words as to the method of treating certain subjects in educating for the Army.

Much greater stress has of late years been very properly laid on the value of "modern languages." How are these too often taught? The tongue and the ear are too often neglected in favour of the memory. The key-note is too often "get marks!" write! read! construe! parse! &c., answer questions in *writing*. To succeed in this the mind and memory need only be well stored with etymological and syntactic facts and rules; the ear and tongue remaining almost strangers to the accent and cadence of so much import in after life.

Again, with regard to history and geography; these should not be taught in a merely general way to boys being prepared for the Army but taught from a distinctly military point of view; especially geography, which should be imparted so as to include not only the position, towns, mountains, rivers, &c., of a country, but the value of otherwise of these and their effect in the case of invasion or defence. Physical geography should have a much more important place in military education than it has.

I conclude this section, then, by urging the necessity of early decision in the choice of the profession of arms, and early military

education for that profession; further that, within the limits laid down for each subject, all subjects should be chosen and imparted and examined upon, not only with a view to entrance into the Army, but also to usefulness in military life afterwards, as a solid foundation for that which constitutes my second section, *i.e.*, education in the Army.

On appointment to the Army the military education of a young Officer assumes an additional phase, *i.e.*, practical military training.

His success herein will depend first, upon himself; secondly, upon his Commanding Officer; thirdly, upon the Staff of Instructors; and, fourthly, upon the character and habits of the Officers of his regiment generally, and particularly of those of them who become his intimate companions.

To commence with the first and last of these four. If he, at an impressionable age, throws in his lot with one or two who have no military ambition, who do their work in a careless, slipshod, and perfunctory manner, who vote everything but leave, sport, and social amusement a bore, he will soon be imbued with their spirit and do likewise. Of such a life self is the centre, self forms the radii, and self describes the circumference.

Education by influence is a factor in military training often little thought of, although far-reaching in its results for good or evil.

Sir Charles Napier, when in command of the N. District in 1839, wrote concerning a certain set of Officers as follows: "These Officers really know nothing beyond fox-hunting, dancing, and shooting; they are, however, a very fine set of young men, extremely clever, and zealous also, when put to their work per force; caring nothing for their profession, and thinking it a bore, they know nothing of it. They are, nevertheless, the makings of the finest cavalry in the world, being full of spirit and talent, with good looks, courage, and honour; in fine they are ready for anything but the dull routine of duty. Few of them mean to stay in the Army, and they will not study. I could, indeed, make anything of them in a camp, but it is vain to try in a district embracing nearly half of England. Two things are certain: they will do their work with spirit when brought to the mark; but the devil can't make them read."

Now the "dull routine of duty" brings the young Officer into constant contact with his men, and if that duty is not performed by him with zeal and intelligence, his example must inevitably affect those men injuriously. I believe that one of the elements which goes to make an Officer popular with his men is what they understand as "smartness." This element, when combined with efficiency, strict justice, and kindness of manner, will make him one whom they will admire, trust, obey, and follow.

In one of Sir Henry Lawrence's essays, we read: "The moral character of a regiment, be it good or bad, fairly reflects the amount of interest taken by the Officers in the well-being of their men. . . . It is not merely the duty of an Officer to attend parade, to manœuvre a company or regiment, to mount guard, to sanction promotions, to see pay issued, to sign monthly returns, &c. The Officer

has higher duties to perform, a duty to his Sovereign, a duty to his neighbours, a duty to his God, not to be discharged by the simple observance of these military formalities. He stands *in loco parentis*, he is the father of his men. . . . There are many idle, good hearted, do-nothing Officers who find the day too long, complain of the country and climate, &c. . . . Some may smile; some may sneer; some may acknowledge the truth dimly, and—forget it.”

One case of the injurious effect of a bad example upon the men will show the logical result and necessary sequence of setting such an example. Sir Charles Napier, when ordering a court-martial to assemble to try a private for insubordination, wrote at the same time to the Commanding Officer of a certain subaltern, that he should “explain to this young Officer what carelessness in duty leads to, namely, commission of crime, and infliction of punishment on soldiers by those very Officers whose conduct set them a bad example. Officers should never forget that they are judges as well as Officers.”

I am thankful to believe that the severe strictures passed by such men in former days now apply to a very small and constantly decreasing minority. Most men now enter the Service with the intention of remaining and of making it their profession. Most Officers study their profession, more or less.

To my mind, the power of influence in this connection is so great, that I think Commanding Officers should carefully consider the character and qualifications of troop or company Commanders before posting a recruit Officer to do duty under them.

In a paper read by me in this theatre in 1884, I stated with reference to the actual practical instruction of the recruit Officers: “It is in no spirit of carping criticism that I venture to suggest that the method adopted in the instruction of junior Officers is in very many cases unsatisfactory, and does not attain the object which should be kept in view by those who carry out their instruction.”

An Officer is posted to a regiment, and finds himself on the barrack square among the recruits. He goes through the course of drill from the “goose step” onward; is taught the use of weapons to a limited extent; he is taught to ride, shoot, march, &c., and as soon as he is considered efficient in the *performance* of these, he is “dismissed.”

I contend that no recruit officer should be “dismissed” until he can *impart to others* what he has learned for himself. This is a most important point, and all depends on the Commanding Officer, the Adjutant, and the Staff of Instructors.

If the Commanding Officer knows what a good system of instruction is, if he has one and can carry it out himself, and can train others to carry it out effectually, well and good, but some Commanding Officers unfortunately leave the whole thing to the Staff of Instructors and take their chance as to results.

Again, when it comes to drilling and moving the regiment, others are over fond of doing all the drill themselves. Many troop and company Officers are called upon by the General, at inspection time

to drill their regiments who have had little or no practice in doing so beforehand.

It is easy enough to give the juniors opportunities in this direction. How easy it would be on days when squadrons and companies are being drilled in the spring, under their own leaders, to break them into two or three, and practise a few regimental movements, making the juniors give the detailed instruction for the movements of each unit.

The instruction of the rank and file is not now, as of old, confined to the two or three: under the present system of squadron and company "military training," every Officer is *supposed* to be able to impart instruction; but the gift of imparting instruction in clear and simple language does not fall to the lot of the many, therefore, the greater should be the trouble taken with those who have to acquire it.

If a Subaltern or Captain cannot efficiently command his troop or company, cannot correct the erring, is constantly giving wrong words of command, is frequently finding himself in the wrong place, or moving in the wrong direction, it may fairly be presumed that something is wrong with the system of instruction in vogue in his regiment, or that he is such an unmitigated duffer that no system, however good, could make anything of him. Yet, whatever merit the system possesses, *per se*, it should be borne in mind that it is the man, the living voice and example, that gives it life and force.

In my humble opinion, the weakest point in our armour is this matter of imparting instruction by Officers generally.

With regard to promotion to higher rank, I believe it is the rule in the German Army that before a junior Lieutenant is promoted to higher pay and grade he has to pass a very searching and detailed examination; again, before he can obtain the rank of Captain, he must pass a still more severe test; should he fail in this, and evince a want of capacity as a leader and instructor, he is forthwith transferred to the *Ettapen Truppen* or some departmental service; thus, while still young, he is posted to a position in which he may still be of use in the service.

In our Army numbers of men have, in days gone by, been passed by boards of examination, or, on the strength of charitably worded confidential reports, who have served on into middle life, only to find their way barred to the higher ranks, and eventually, having been passed over, to "hang on" for the first available pension, and then retire in disgust.

I think we are approaching the end of such a state of things, and that the examinations are becoming more practical, and the results more satisfactory.

As to confidential reports by Commanding Officers and Generals, I think there is a general feeling among the junior ranks that the day of the idea: "Oh, he is such a good-natured, sporting fellow, no one could report unfavourably of him," has passed away.

Having in view the future well-being and success of the candidate for promotion, it is no kindness to him to be easy-going with him during the time he is being instructed in his early service. It is

false charity to speak of him in a confidential report in terms other than express his actual military value. Nay, more, it is dangerous to do so, in view of his possible active employment in face of the enemy—dangerous with reference to himself, and dangerous and cruel with reference to those whom he may command, if he is unfit to do so. Active service before the enemy and on the field of battle, are time and place wherein to give expression to that which has already been learnt in peace. We should *gain* experience on the battle-field, in other ways than by buying it at the cost of our men's lives.

I think the examination tests for promotion may be taken as generally satisfactory in their results. Confined, as they are, to subjects bearing on the demands of military work, and divided into two parts, viz., a paper examination and practical work in the field and model room, the candidate must read and study, and evince ability to express orally and explain to others that which he has learned. It is upon this last point that examiners should seek to enforce an increasingly high standard. It is this that will show how the candidate has been trained in his regiment, as it is mainly the instruction imparted to him there that is the preparation for his examination. To my mind the best available preparation for the paper part of the examination is the "garrison class." Here picked men carry out a regular system of instruction in the necessary military subjects. The value of this preparation may be gathered from the following extract from a letter from an official of the Education Department, dated 2nd May, 1887: " . . . the facts being that among those who had attended garrison classes there were only about half the number of failures as compared with those who went up for examination without going to a garrison class."

I look upon the garrison course as a very efficient stepping stone towards the course of preparation for entrance to and work at the Staff College.

The Officers appointed to the Royal Engineers have, shortly after they join, to go through a two years' course of instruction at the Chatham School of Military Engineering. This course covers an enormous amount of ground. It includes the accurate surveying of country, the laying out of roads and railways, astronomical surveying, the preparation of ground plans for building, fortification in all its branches, mining, military bridges, the attack and defence of fortresses, and all the recent developments of permanent fortification; electricity in its application to telegraphs, mining and lighting, and visual signalling; construction; the theory and practice of all building work; instruction in all material used, stone, brick, iron, wood, &c.; estimating quantities and drawing up specifications; military law and tactics; chemistry as applied to engineering work; steam engines, their construction and repair.

A limited number of Officers go through a course of submarine mining, telegraphy, and photography. A further limited number are sent to Sir W. Armstrong's works at Elswick to learn practically all about iron, and to the London and North Western Railway to learn practically the details of railway traffic management.

Two questions naturally arise with reference to this elaborate course. First, can thoroughness of instruction be obtained in the time allotted? Secondly, is it quite wise to send Officers to the School of Military Engineering so early in their service?

A Line Officer is allowed to attend two garrison courses, once *after* promotion to Lieutenant, and once *after* promotion to rank of Captain. An artillery Officer must have six years' service with troops before going through the senior class at the Royal Artillery College. There are several weak points in the School of Military Engineering system I may be permitted to refer to.

The purpose of a garrison course is ("Queen's Regulations," sec. ix, p. 48) "to assist Officers in preparing for examination," and the examination usually comes shortly after the end of the course; but at the end of the Chatham course there are no examinations whatever. There is no test by examination of the work done or of the knowledge gained. Not only so, but the engineer Officer who has finished the course at Chatham is never again (in this country) examined in fortification or surveying except he desires to enter the Staff College. On the other hand, the Government of India insist that all Royal Engineer Officers who elect for permanent Indian service shall go through a course of instruction in professional subjects *after* they attain the rank of Captain, *i.e.*, after some eight to ten years' service on an average.

I referred just now to the senior class at the Artillery College. I regret that the limits of this paper prevent my doing more than briefly touching upon the work done in that valuable institution. For full and most interesting information I refer you to Major Baker's excellent pamphlet "The Artillery College," published by Harrison. With a staff of some thirty instructors, and a "morning state" showing throughout the year a strength of from 250 to 350 of all ranks under instruction, some idea of the importance of the College may be gathered. The courses are as varied as they are numerous. The "senior class," two years' duration for Officers of not less than six years' service; subjects: mathematics, armour, chemistry, metallurgy, manufacturing, electricity, heat, steam, and mechanism.

Next comes the "Firemaster's Course," open to any Officer below the rank of Major.

Then the "Special Class" for detailed Officers. Next, the "Position Finding Class."

Next, the "Officer's Long Course," lasting eight months; carried out at the College, the School of Gunnery, and including visits to Okehampton, Lydd, and Golden Hill.

"Store Accounting" comes next, then the "Junior Class," which consists of Officers appointed direct from the Militia, Colonial Military Colleges, or the Colonial Forces.

Why, may I ask, have not Officers appointed to the Line from the Militia a course of surveying and fortification when, say, they are dismissed their drills?

Then we have classes for Gunnery Lieutenants, R.N., for Royal Marine Artillery Officers, Torpedo Lieutenants, R.N., a Promotion

Class, Field Sketching Class, Master Gunners' Class, N.C.O.'s Long Course, a Class for Telegraphists, for Warrant and N.C.O.'s of Indian Ordnance Department, Chief Armourers, R.N., for Armourer's Mates, R.N., and for Military Artificers.

The system at the Artillery College is strong where the School of Military Engineering is weak, for there are examinations at the close of all the courses at the former, and further, lads are not sent to the College upon appointment.

I must now refer to the Staff College; its name explains the purpose for which it exists. The details of "qualifications requisite for admission" fill a page of the Queen's Regulations, commencing with "a service of not less than five years previous to examination." The course, lasting two years, is looked upon by some of the unthinking as "a good loaf," or "a comfortable escape from regimental duty," and a proposal was made some time ago to reduce the time of residence there. I think it was wisely decided that the course was by no means too long. The time spent there is no "loaf," and the instruction obtained there must be of value to every Officer, whether he obtains employment on the Staff or not.

I am not in accord with the present distribution of marks at the entrance examination for the subjects of "Fortification" and "Tactics."

Twenty-eight vacancies are offered for competition annually, of which only three may be filled by Officers R.A., and two by Royal Engineers. Now, for these Officers, "Fortification" is a most important subject, and at the Royal Academy they have already received a first class education in it before joining, at the Royal Artillery College, or at the School of Military Engineering afterwards. So much so, that inasmuch as the scope of the examination for entrance to the Staff College is limited to that specified for Captains before promotion to Major, they ought not to require any special preparation in this subject for the Staff College, but should make full marks, and they are in a favourable position compared to Line Officers by thus having more time to give to the study of other subjects. I look upon "Tactics" as all-important for both "Line," R.A., and R.E. Officers alike. For "Line" Officers, certainly, Tactics are far more important than "Fortification," yet 600 marks are allotted to each.

I conclude that as but five R.A. and R.E. candidates enter the College to twenty-three Officers from the Line, &c., Tactics should have, say, 900 marks allotted to it, and Fortification should have about 300.

I use this proportion to express my view of the relative value of the two subjects to the Officers of the Army generally.

To the young aspirant for Staff employment I would say, "Enter the Staff College while young." The examination for and work in the Staff College should be easy to any Officer who has passed with honours from Sandhurst or Woolwich, and has gone through a Garrison Class, the Artillery College, or School of Military Engineering with credit.

The system of attaching Staff College Officers to arms of the

Service other than their own to learn interior economy and drill, &c., should be beneficial if carried out properly.

The Officers should not be regarded as onlookers in the corps to which they are attached; they should share in the ordinary duties as far as possible.

The system of "Staff Tours" during which memorable battle-fields are visited, examined, and discussed is a move in the right direction in which many Regimental Officers would like to have a share.

We must all admit that the encouragement given to Officers to study modern languages by the recent introduction of examinations for Interpreterships is having the desired effect. I am not quite clear, however, that the division into two classes is the best plan; I incline to the belief in qualification for Interpretership alone.

Outside the Staff College and regimental training, education in the Army may almost be described as "technical." In it are included gymnastics, fencing, musketry, pioneering, field engineering, ambulance, signalling; the Veterinary School with its lectures on shoeing, saddlery, and forage, &c.; schools of instruction for auxiliary forces; the Army Service Corps School of Instruction where Officers are taught to judge the quality of provisions, to understand the system of baking bread and the killing of bullocks, &c., to which may be added the "School of Cookery."

On the other hand, questions of theory find ventilation in this, the Royal United Service Institution, the Indian United Service Institution, the Dublin Military Society, the Aldershot Military Society, the Royal Artillery and Royal Engineer Institutes, &c.

The value of such an institution as this can hardly be estimated, and I confess it is a matter of astonishment to me that the number of members is not fourfold what it is.

The usefulness of the contents of the reading room, map room, and library is not to be measured by the amount of the subscription.

Before passing on to a most important point in military education and training, I would like to say a few words about inspections. One or two days, to my mind, is too short a time to give to the inspection of a regiment.

There is not much time to find out the individual value of the Officers, especially those of junior rank, concerning whom there are two points of special import: can they handle and instruct their men, and do they study their profession? To find out these things effectually takes time. With regard to the latter, a plan I adopted when in command of my regiment might be found useful. One afternoon I directed the Adjutant to issue an order that every Officer should send to orderly room by 10 A.M. the next day all military books of whatever description in his possession. When my routine work was done, I examined these libraries; some were encouragingly large, varied, and well chosen; others small; one or two not up to regulation. I not only considered the number and character of books in each library, but I carefully examined the condition they were in. Some showed signs of regular use; others, though in a

sense old, were fit to sell as new. I found, in fact, that the general estimate I had formed touching the question of study was borne out by my examination of the books. An Officer brings his books for the Inspector's examination, but how seldom is any notice taken of them!

Further, at an inspection, I think the drill instructors should be seen and heard at work with squads of recruits.

Further, too much notice is given beforehand as to the date of inspection; there is too much special preparation for it, and, as a result, it is too often no criterion of the *average* work of the corps.

I now pass on to consider a most important point: the training of the eye. I am convinced that in this we come far short of what might be accomplished. The value of the "object lesson" is now well recognized by the general body of those who train the young. You can train a man through his powers of hearing and remembering what you teach him; but you can train him more effectually by instructing him through his powers of vision as well.

This applies very specially to instruction in outposts and reconnaissance during the winter months. How often the custom has been to take a regiment out and form a line of outposts along a given road or river: the positions for the reserve, supports, and picquets are chosen, the vedettes are posted, and they stand for hours looking to their front at—nothing. It may be a cold day with a biting north wind, the men know that no opposing force will come, and there is nothing to attract and keep up their attention. How then can interest be expected or maintained? The same applies to reconnaissance.

Recognizing the weakness of such a system, I always divided my regiment into wings under Officers detailed in turn. Umpires were appointed and schemes issued. One wing would take up a line of outposts; the other would reconnoitre and attack. The Officers Commanding and the Umpires sent in written reports, and the Lieutenants sent in maps. Again, one wing would escort a convoy made up of the regimental transport, and attempt to gain a certain point, while the other would find and attack. Reports as in the first case. What was the result? A marvellous display of keen interest on the part of all ranks. Remarks on the day's work were posted up in the different messes, the corporals' room, canteen and recreation room, and I was informed were the basis of keen and animated discussion.

Now, in training the eye, a difficulty arises, inasmuch as the zone of sight of a group or individual, say, in a line of outposts is in most cases limited to the extent of ground or number of objects watched, to the sphere of work allotted; the interest, then, of the individual is too often limited to that sphere. This was brought home very forcibly to my mind by overhearing, one day, the question, "Well, so-and-so, what happened your way to-day?" This set me thinking. I came to the conclusion that it was not enough to explain, beforehand, the general and special ideas, and to remark on the day's proceedings; so, in 1884, I tried a system, with the permission of my Commanding Officer, which produced excellent results.

The regiment was divided into wings and worked as before described, then, after stables in the evening on the same and following day, those who took part were assembled in the largest available room, where I had prepared a model such as you see before you, showing the ground they had worked over, and the positions occupied, &c. The model is formed by placing together six or more barrack tables, covered with blankets, under which are placed bolsters, hay, straw, or anything that will show the feature of the ground. Brushes are used to show woods, string for railways, strips of brown and blue paper for roads and rivers, matchboxes for houses, chalk marks for fences, and dominoes, beans, or matches for men.

The model was then explained to the wing, and the Officers were directed to place their men on the model and move them as they had done on the actual group. They were questioned as to the route taken and what was observed, and where. Mistakes were explained and general remarks on the work made. The rank and file were also questioned. The interest shown and the progress made by all ranks was most encouraging.

The model was useful in yet another way. I made models from a local map and ordered ten or twelve non-commissioned officers into the room, where pencil and paper was supplied them, and then and there they had to reproduce the model on paper.

By this means the young Officer and man not only hears about things but he *sees* them in miniature, he compares the real with that which represents it, his mind is enlarged, and his eye is trained.

You have but to make the model large enough and use a screen, to enable you to work out regular schemes.

During squadron military training, my squadron leaders used these barrack-room models, during their lectures, with marked effect. By this means the eye can be trained in a way that no book reading will effect; and the young Officers and men will gather the reasons for many things they carry out in the field.

The successful use of models in this way depends largely upon the lecturing powers of the Officer and his tact in instructing and interesting his men.

Some "don't believe in lecturing their men;" they overlook the difference between "lecturing men" and "lecturing *to* the men." They may not have gifts in that way, and their prejudice is a further hindrance.

Then there is the young gentleman who thinks it is quite sufficient to read a few sections out of the "red book" to his men because he is too lazy to work up the subjects himself. He does not produce much effect. Then there is the loud-voiced, heavy-heeled young gentleman, who means to let you know that he is "all there." He commences with a "wisdom-will-die-with-me" style, he browbeats his audience, and the first man who makes a mistake is declared to be "the biggest fool in the world." He does produce a marked effect in the shape of prompt and free issue of a "wet blanket."

Then there is the man who studies his profession, who masters his subjects, uses simple language, whose questions have nothing of the

Chinese puzzle about them, whose manner is encouraging and helpful whose men feel that he has something worth knowing, and that his chief object is to share that knowledge with them.

Such Officers produce the right effect in increased efficiency and knowledge among those whom they command.

The next step is the training of the eye on a larger scale on garrison models and maps, then out of doors in the examination of reports on, and making maps of, country, positions, roads, and rivers: then the further training of the eye to be obtained at autumn manœuvres on a large scale.

One great difficulty in the way of the latter is our present system of garrison distribution. It was, no doubt, necessary in the days when the country was deficient in police, in railway and telegraph services, to have troops scattered in small garrisons all over the country; but the police force is now ample; railway, postal, and telegraph services abound, and yet our troop distribution remains almost the same.

“What about the territorial system?” says someone, in reply. I would simply remark that, under our present system of Government education, the rural population is steadily dwindling; the men are being attracted in increasing numbers to the large centres of population where the bulk of our recruits are now obtained, and thus, one of the main principles of territorialism is being slowly, but surely, undermined.

If the Government cannot do away with small, dispersed garrisons and establish large garrisons or camps, it should find the money and give facilities for holding autumn manœuvres on a much more extensive scale than obtains at present. Not to do so is “penny wise” in times of peace, but many “pounds foolish” in time of war.

We require far greater opportunities for instruction in duties which bring all arms into combined action. To repeat a simile used by me here on a former occasion, “as the hearing of the ear may bring the foot into readiness to move; as the seeing of the eye reveals the direction for the blow of the hand; as the foot may not say to the hand, ‘I have no need of thee’; and the hand without the guiding eye would strike wide of the mark, so cavalry, artillery, and infantry with their auxiliary services should have ample opportunities granted them of cultivating those inter-relations for exercising those characteristic and individual functions which, carried out in unison, weld eye, ear, hand, foot, and body into one corporate entity, form one harmonious whole, complete and perfect in all its parts, and mobile in all its movements.”

Owing to the advance of warfare as a science; owing to the enormous scale, as to numbers employed, upon which most wars must be waged in the future; owing to the great progress made within recent years in the manufacture and deadly use of arms of precision; owing to the greater freedom, self-dependence, &c., engendered amongst the Commanders of small bodies of men, and amongst the rank and file themselves, it is all the more necessary now to work out on a large scale during peace problems and combinations of movements tha

may be forced upon us in war. Not to do so is, as it were, to advertise the performance of a military tragedy for which the most perfect scenery is obtained, actors engaged, and beautiful dresses provided; to open the doors and admit the public to see—what? the performance attempted without previous rehearsal, and for which the actors have, consequently, but very imperfectly learned their parts from books.

What applies to the commanding, leading, and work of the three arms in unison, also applies to the departments of supply, transport, and hospital. All these departments require exercise in times of peace in conjunction with large mixed forces. To expect them to do their work efficiently in times of war without such antecedent exercise is, so to speak, to enter a good horse under a heavy impost for a great race, upon the winning or losing of which depends a national fortune, to bring him to the post ill-fed, ill-groomed, ill-equipped, and out of condition, to be disgracefully beaten by an otherwise inferior animal.

Autumn manœuvres, flying columns, and cavalry manœuvres have recently obtained a firmer footing in our military system; but to my mind the doses have been too homœopathic. If our system of garrison distribution were based on modern requirements and not upon circumstances long since obsolete, the question would present fewer difficulties.

Sir Charles Dilke and Mr. Spencer Wilkinson, in their book "Imperial Defence," say, "The British Army at home has no Generals . . . and can have none until its battalions are settled and grouped into brigades, divisions, and army corps."

While I differ with the authors as to what they intend by the term "settle," I concur with the idea of forming garrison brigades and divisions where possible, but to increase the camp at Aldershot to the capacity for an army corps would entail the buying of large tracts of land, adding extra ranges, and building barracks to an extent that would make the strongest Government tremble for their existence. The author's statement as to our having "no Generals," I pass with the remark by a wiser man than they or I are or am, *i.e.*, "all trades require apprenticeship save one—critics are ready made!"

The necessity for a thorough military education and training for our young Officers is increased by the fact that vast strides have been made educationally among the rank and file.

Before the year 1887 a recruit had to attend school for six months, or till he obtained a 4th class certificate of education. The examination for this certificate comprised the copying of about five lines of print, containing words of two syllables, working six questions on the first four rules of simple arithmetic, one example in notation, and one in numeration. This standard was about equal to that passed by children of eight years old in our civil schools.

The general education of the country having advanced under the Voluntary and Board School system, it was recommended by a special Committee, of which Lord Harris was Chairman, to abolish the six

months' compulsory attendance at school, and also the 4th class certificate. This was done, and now attendance at school is voluntary but promotion to non-commissioned officer's rank depends on the possession of a certain certificate, according to rank.

I think a suggestion offered me by an Officer of the Education Department might prove of value in practice, *i.e.*, for Colonels to select promising privates and prevail on them to attend school, with a view to obtaining a 2nd class certificate, relieving them from some duty, such as night guard, &c., their promotion to depend upon other qualifications as well as education.

Although some men thus obtaining a 2nd class certificate would not be promoted, for various reasons, yet they would be benefited by having received a degree of instruction and knowledge likely to be useful afterwards in civil life.

That the progress of military education among the rank and file is satisfactory will be gathered from the tables I now venture to submit for your consideration. I have taken them from various Returns given to me by Officers of the Education Department, and they present the case from several interesting points of view.

Percentage of N.C.O. and Men in possession of Certificate of Education according to Class.

1873.	1881.	1891.
1st class..... 0·75	1st class..... 1·00	1st class..... 1·26
2nd „ 8·30	2nd „ 15·31	2nd „ 19·71
3rd „ 11·35	3rd „ 12·94	3rd „ 17·18
4th „ 9·30	4th „ 30·89	
Not certificated. 70·30	Not certificated. 40·37	Not certificated. 61·85
<hr/> 100·00	<hr/> 100·00	<hr/> 100·00

Had the 4th class certificate been retained, it is obvious that the percentage of “not certificated” shown in 1881 would have been greatly reduced in 1891.

The following table is taken from a Return which is not now issued it is in G. O. 121, Sept., 1883, and sets forth the percentage of candidates who passed their examinations. I only take the branches of the Service of a strength of 1,000 and over:—

1. Foot Guards..... 97·72	4. R. Engineers 90·60
2. Cavalry..... 91·45	5. Infantry 89·33
3. C. and Transport.... 90·99	6. R. Artillery..... 87·65

The next set of tables shows the percentage of certificates obtained in branches over 1,000 strong, according to “strength.” They are chosen from the period before the abolition of the 4th class test and after:—

1884.		1891.	
R. Engineers.....	64·21	R. Engineers.....	60·84
M. S. Corps	58·90	M. S. Corps	57·84
A. S. Corps	47·49	A. S. Corps	53·38
Cavalry	43·94	Cavalry	50·93
Foot Guards	38·36	Foot Guards	42·18
R. Artillery	36·88	R. Artillery	40·19

Thus showing, that in spite of the abolition of the 4th class test, 15·53 per cent. more certificates were obtained, and further demonstrating the steady advance of education among the rank and file.

This is eminently satisfactory; but besides the education imparted necessary to obtain a certificate of education as at present, I think it would be a great gain if there were special classes and courses for Line non-commissioned officers and men at the different centres where garrison instructors are located, so that they might be instructed systematically in surveying, sketching, field works, and the first principles of tactics. The foregoing tables should suffice to prove that the soldier is no longer, if he ever was, an unthinking, automatic, muscular machine, but an increasingly intelligent entity, to be encouraged in all those necessary paths of self-culture and control which will fit him to return at the end of his military career to the ranks of civil life as a useful addition thereto, and not as an object of distrust and suspicion, too often to end as a burden upon the poor rates.

Considering the steady growth of education among the rank and file, the young Officer should ever remember that he lives and works amidst the changing circumstances and varying requirements of a rapidly developing science and art.

Regarding it as a great privilege to serve the interests of an Empire so magnificent, whose history and traditions are so glorious, and whose prestige is so widespread, he should be imbued with a full sense of the fact that his responsibilities are commensurate with his privilege, and while he seeks to qualify himself as an efficient instructor and leader of men, he should ever be an industrious and zealous seeker after fresh knowledge, and maintain the attitude of a patient learner, and even in the consciousness of a degree of attainment to remember there is always more to be attained; thus learning, thus working with his own, his regiment's, his country's, and his Sovereign's honour dear to his heart, he is bound to become a useful and efficient unit in that branch of the Service to which he belongs, and will surely prove the truth of the saying, "*Diligentia facit famam.*"

Lieutenant-General R. N. LOWRY, C.B.: I will not venture to follow the gallant reader of the paper through the most interesting details which he has brought forward this afternoon. There are two or three remarks, however, that I would like to make. Colonel Graves has, to my mind, treated a vastly important subject in an admirable way. No one can have heard this paper without, I think, having had conviction borne in upon him how much an earnest, zealous, and able Commanding Officer has it in his power to do for his Officers and men. I entirely agree

with almost everything said, especially as regards the first part—the education of Officers for the Service. It cannot well be begun too early, and cannot possibly be made more apt than it should be for the special preparation of young men for the profession of their choice. The great difficulty is to get youths and their parents to ascertain and fix early in life what is the bent of their aspirations in the matter of profession. They do not, too, generally arrive at and decide on that until rather late; but if they could arrive at it, I entirely agree with the reader of this paper, that it is most important to turn them early to special preparation for it. I think Colonel Graves has paid a very deserved compliment to those so-called “crammers,” who prepare young men for the Army. The Service is deeply indebted to them, and they have not always been appreciated as they should have been. There are amongst them some of our ablest Officers. These Army tutors have, in very many cases, proved of incalculable benefit to the young men who come to them to be prepared for entrance into the Service. I could have wished, however, that, while tendering due credit to these able men, Colonel Graves had alluded to other factors certainly not less important to the fitting preparation of young men for the Army. Over twenty years ago some of us were assembled, in the theatre of this Institution, under the presidency of the late Duke of Wellington, to found the United Service College at Westward Ho, a college which has been in active operation for all these years, under the chairmanship of General Sir Charles Daubeney, and has been doing, in a quiet way, admirable work in educating young men for the Services. A few years later another valuable institution, with which I was also long and intimately connected, and in the good work of which I am still deeply interested, was founded—I allude to the Oxford Military College. Mainly originated by the late General Eardley Wilmot, it was afterwards admirably developed and presided over by the late Colonel Duncan, M.P., who threw his great zeal and energy and ability into the work. I think it must be within the experience of most Officers here that those two colleges have done admirable work for the profession, and that the training at the college at Cowley, in the way of horsemanship, of swimming, of drill, and of athletics of all kinds—side by side with the highest mental culture—has been of the greatest possible advantage to the Service. I should like also to include the Military College at Kingston, Canada. That college has already prepared a number of Canadian young men, who have done honour to themselves, to British North America, and to the Service, and I am quite sure the more we strengthen and support such public institutions for the training of young men throughout Great Britain and the Empire at large, the better it will be for the Service. Let me say, as regards the second part of this admirable paper, though the lecturer did touch upon it very forcibly, that I do not think we can attach too much importance to the after-instruction given to our Officers by this Institution. I would, with all my heart, our young Officers—naval as well as military—became members of it earlier in their service, that those stationed at Aldershot, Woolwich, Chatham, Portsmouth, and all parts within reasonable hail of London would come here in increased numbers, and have their education developed and matured by taking greater advantage of the Royal United Service Institution.

Captain JAMES: Mr. Chairman and gentlemen, I am sure that, in the first place, we owe a debt of gratitude to Colonel Graves for the very excellent paper he has read to us this afternoon. In the remarks that I propose to make I shall limit myself almost entirely to the consideration of the education of Officers before they enter the Service, and to the education of Officers when they have obtained Her Majesty's commission. I dare say a great many of you in this Institution are aware that with the subject of the first portion of my remarks I am somewhat intimately connected; but I ask you to believe me when I say that I shall put aside entirely my professional capacity, and merely aim at the ideal I have always set before myself as being that which should be before the minds of those who devote themselves to the preparation of the Officer corps, which in the British Army should be the equal of that which exists in the German Army. There can be no doubt that Colonel Graves has hit the right nail on the head when he said that, in a very great measure, you cannot begin the education of an Officer too young. He instanced in that regard the Navy. No one ever cast a slur upon the Navy

because their men are not taken either from the public schools or even the Universities, and we know that in professional capacity and in knowledge of their work, the British naval Officers stand second to none in the world. I wish to say that there is one important fact which is becoming more evident almost every day, and which a very large number of people in England do not appreciate at the present moment, and which, I venture to say, no educational establishment whatever which is devoted to the preparation of younger boys at the present time takes adequately into account, and that is the desirability of an English Officer being thoroughly acquainted with foreign languages. An English Officer who does not know German is like a one-eyed man: half the military literature of Europe, and that by far the best half, is a sealed book to him. And I can say, from a very considerable experience of young men under my charge, there is, so far as I know, only one school in England which devotes sufficient attention to the education of boys preparing for the Army in this particular. There has been recently started a college at Stony Stratford,¹ which undertakes the preparation of boys in this particular line, viz., that at an earlier age than it is at present possible at any of the public schools in England, boys shall be prepared for the profession which they afterwards propose to pursue in life. So far with regard to the preparation of Officers before entering the Army. With regard to the education of Officers in the Army, I can confirm very strongly what Colonel Graves has said. When I first started my present business I constantly had with me a large class of Officers who wished to be prepared for promotion. These men, in nine cases out of ten, were those who had got in in the old days, and had not been through the modern military curriculum. They had entered the Service without difficult competition: they had not been induced to pursue military topics, and they felt that unless they received some special preparation they would be unable to pass the promotion examination. That class has now died out almost entirely, or has reached Field rank, and the more junior Officers now in the Army, in a very large number of instances, pass their promotion examination without any assistance whatever. That is, I think, a proof of the advantage which the Army at large has received from the additional examination pressure which has been put upon them. There is, I believe, still a great deal to learn with regard to education in the Army. If I may venture to say so, our education in the Service is for the Officer a great deal too theoretical, and not half enough practical. We are apt to think that there are only four subjects necessary for military salvation—topography, fortifications, tactics, and law—excellent servants, but very bad masters; and they have been put rather in the position of masters than that of servants to the men who are to make use of them. There appears to me to be a theory amongst a certain class of military educationalists that everybody can be a first-class topographer, or if he is not he ought to be. And it seems to me the times of instruction and the times of examination are directed far too much to producing a series of impossible geniuses in this particular direction, rather than seeing that they have a practical knowledge of the work which they would be called upon to do in the field. I will venture here, perhaps, to go outside of what I laid down as the subject of my remarks, and will say that this is even the case in the practical company instruction which now goes on; that there is too much theory and not enough practice. I think there is a great deal of knowledge of a practical character which it is extremely hard to test by examination, and which can only be tested by the superior Officers of the Army, seeing that those who come under their command are thoroughly well acquainted with what ought to be their everyday knowledge. I could tell a number of humorous anecdotes on this head, were I to trouble you with them, but I think, perhaps, they might lead to laughter, and perhaps trains of thought which would be injudicious in a judicial assembly of this kind. I know destructive criticism is worth nothing, and unless you are prepared to propose something better you ought never to criticize at all. My view about these promotion examinations, as applied to Officers, is that instead of having the large number of questions, as is usually the case now-a-days, it would

¹ St. Paul's College, Stony Stratford, Bucks. Letters should be addressed to the Head Master there.

be much better if the questions were fewer in number, but required a greater exercise of intellect to answer them. That is the system upon which the German examinations for entrance to the Staff College in Germany are conducted, and to my mind we might very well take a leaf out of the German book in that respect. I quite coincide with what Colonel Graves says about the examinations for entrance to the Staff College. I do not think stress enough is put upon tactics. I think that the tactical examination, for instance of the Staff College, and also tactical examinations generally, have improved of late years, but I hold there is still room for further improvement. I may draw attention to the very curious way in which the course of the examinations is determined in England. We have, in the instance of the Staff College, an examination on the subject of fortifications, which is divided into two parts, the majority of marks being given to field fortifications, and the minority to permanent fortifications—in my opinion a very reasonable and proper distinction. When the authorities first started the examination in permanent fortifications at the Staff College, they said it would be limited to the elements of the modern French system and the polygonal system, but when the first examiner was let loose on the Staff College candidates he proceeded not only to examine on the elements of the modern French system and the polygonal system, but also to examine on coast defence and attack, and defence of fortresses. And then came in the red-tapeism to which I object. Naturally the candidates expostulated; and instead of saying what ought to have been done, admitting that the paper was a mistake, the authorities in question said, "Of course the elements of the modern French and the polygonal systems necessarily implied the attack and defence of those systems." You might as well say that the ABC includes syntax and prosody, when in the ordinary meaning of the term it does nothing of the sort. I say so long as you have examinations you necessarily must have examiners. I am inclined to look a little after the examiner, and the only way of looking after the examiner is to do this, let us know who he is. At the present moment the military examination papers are the only papers set in the wide world as to which the examiners who are selected are men of whom you know nothing whatever, and whom you cannot get at. I believe in the value of publicity. I believe in having someone to hang, and even an examiner is not always perfect, and if he should strain his powers, for goodness sake let us be able to get at him, but we cannot do so at the present time. Then as to text-books, they are in my mind an abomination. Jones' opinion about tactics are no better than Smith's or Brown's: very likely they are not as good, and I certainly think it is a great mistake to say that you shall get your tactical knowledge from any one particular fountain head. The same thing applies to every text-book. Take, for instance, the text-book on fortifications used at the Royal Military College, Sandhurst, with which you, Sir, are no doubt intimately acquainted. That book dates from the year of grace 1884.

The CHAIRMAN. A new edition is being got out now.

Captain JAMES: In 1889 there was prepared a second volume—I do not think it is any straining of terms to say that a second volume was produced in the shape of addenda and corrigenda, which numbered twenty-nine pages, the original book having 193.¹ When I was a Cadet at Woolwich, or after I got my commission, I was examined on the question of education at military schools, and I said, amongst other things, that I thought it was a great mistake to require Cadets to write their own text-books. That apparently is not thought to be a mistake now, because in order to correct the text-book on fortifications that is used at the Royal Military College, Sandhurst, and by Militia Officers preparing for promotion, and to put in the necessary corrigenda, is an operation which requires about a fortnight's work at a moderate calculation. There is another reason why I object to text-books. Text books multiply. In my opinion if you have a definite Service regulation, that regulation should be kept, and no other should be adopted. With the greatest respect to the text-book which is coming out, I hope you will stick to the Chathan

¹ Moreover this corrigenda came out after "Instruction in Military Engineering," vol. i, part 1, dated 1888, and differs from it in many points. This difference in official text-books tends to confusion, and is much to be deprecated.

book as the real fountain head of authority, because I find that whenever you have a difference in text-books you are very likely to have Brown's opinions, Jones' opinions, and Smith's opinions, which are not, perhaps, on the whole as good as those which are given by a Committee of Officers, who have special knowledge on the subject. There remains very little for me to say. I am quite sure of late years we have made great progress, but I am convinced of this, that unless we really recognize in the Service that education is a desirable thing, we are not likely to make the progress that we might. There is a very curious commentary I might make to what I have said : I believe an Officer can get leave to go to the Derby, but he cannot get leave to study for the Staff College. Whether the Service is likely to be the better by his visiting the great saturnalia or by his devoting his leisure time to the study of military science is a point which I have the greatest pleasure in leaving to this audience.

Major C. M. WATSON, R.E. : I should like to say a few words about one point in the paper, viz., questions of the education of engineer Officers. To me, as an engineer Officer, of course this seems to be a very important point, and though Colonel Graves has said some things with which I agree, there is one remark he made with which I am not in accord with him. He gave a long list of subjects that engineer Officers ought to learn, and I am sorry to say, for the sake of the young engineer Officer, it does not include them all; I wish it did. In addition to the subjects in that list they have to learn the whole of the duties of an infantry Officer as well as their own. Colonel Graves suggested that the engineer Officer, when he left Woolwich, should not go to Chatham for some time. Now it seems to me that if he did not go Chatham he would not be an engineer Officer at all; he might be so called in the Army List, but he would be totally useless for the duties of his profession. It is not until he has had those two years at Chatham that he is really of any use, and is worth his pay. It is really important that engineer Officers should receive a thoroughly good education before they are sent out as reliable Officers. I might mention that this very point was referred to a Committee, of which Lord Morley was President, in the year 1885. Some people then thought the Chatham course was too long, and a Committee of distinguished Officers was appointed to see whether it could not be shortened. After a long investigation the Committee, in their report, gave it as their opinion that "in order to keep up the high character of the Corps of Royal Engineers it is absolutely necessary that every Officer should, at some time during the earlier part of his career, pass through the whole of the Chatham course of instruction." I entirely agree with Colonel Graves that it would be an admirable thing if engineer Officers could go back afterwards for a further course, and if at the end of that further course there could be an examination; but in order to enable this to be done it would, of course, be necessary to increase the corps, and it might be difficult to obtain authority for that. There is one point I would like to allude to with regard to the course at Chatham. In addition to our engineering work, some Officers every year are taken abroad to visit the battle-fields, in order that they may have practical acquaintance with tactics. It has struck me that it is rather a pity that cavalry and infantry Officers could not, in some way or other, have the same advantage given to them. For example, those Officers who had most distinguished themselves in passing the promotion examination might be given the opportunity of practically studying the battle-fields abroad.

General Sir ROBERT BIDDULPH : The importance of the subject of the lecture to which we have listened to-day is so great as not to need any apology on the part of any of those who join in the discussion. It covers a great extent of ground, and therefore I do not propose to follow the lecturer into every part, but there is one—the first part—upon which I wish to make a few remarks, that is, on the subject of the education of Officers for the Army. All are agreed that every man entering on any special line of life must have a certain amount of general education before he begins his special line. The point on which difference may arise is where or at what age that line should be passed which divides the general from the special. I gather from the lecturer that he is of opinion that it should begin comparatively at a very early age, and he advocates very strongly the early choice of the Army with a view to the lad being trained solely with a view to a military

future, and I gather him to mean, also, solely on military subjects. I venture to think that is a mistake, and I give my reasons for it. It is a very great object in our Service to have a large number of candidates. If we restrict our numbers too greatly we must surely have a poor result. If you insist upon nothing but a military training you will obtain only a limited number of candidates. Another thing is you do a great injustice to those who fail. Everybody cannot get in, and if those who fail find themselves hopelessly left out for any other profession, then they complain that there is nothing left for them to do but to emigrate to Australia and to become cattle drivers. In that case you are doing a very great injury to the young men who have been prepared. Moreover, it is a great objection that you should educate young men for the Service apart from the young men who are going into public life, or who are training for the liberal professions. You must not have a separate class for the Army; certainly not in these days. Remember that above all things you want your Officer to have the feelings of an Englishman, because he will have to command Englishmen, and if you educate your young man in a very narrow school, perhaps abroad, where he can get quite as good a military education as in England, he will come back an accomplished man, perhaps, but in a narrow groove; he will not have the feelings of an Englishman, he will not understand how to command Englishmen, and in these days, where classes are brought together in a way that they have never been before, you must keep in touch with your countrymen if you are going to lead them to victory. You will not understand them if you do not. Therefore I attach very great importance to the candidate for the Army being educated in England. He may go abroad to learn other things, but he should not go abroad for his general education. I set great store about his being brought up at school with other young men with whom he will afterwards be associated in public life, so that he may find himself to a certain extent in touch with them. The importance of this to England is far greater than to any foreign country. Our country is so cosmopolitan; the English Officer is thrown into such a variety of situations abroad where he has to act in ways that do not at all naturally fall into the military line, that it is most desirable that he should have a more general education than would merely qualify him to command a company. This point is one of great importance, and it is therefore, I venture to think, a right policy that we should if possible get our candidates for the Army from the public schools, because we wish to get them with the feelings and training of English gentlemen. The lecturer mentioned the case of the Duke of Wellington, and I wish also to bring him as a witness on my behalf. When he said that the Battle of Waterloo was won on the playing-fields of Eton, he evidently attributed more to Eton education than to education at a military school in France. Nor do we find that the Duke of Wellington was very distinguished in the early part of his career. It was not until long after he commanded a regiment that he became at all distinguished. The fact was that where he learnt his experience was in the school of war. He was a man of great ability and talent, and that was developed on active service. After all, nothing can develop training so well as active service. You cannot produce an Officer by mere school training who would be ready to meet any emergency. They say an ounce of practice is worth a bushel of theory. If you quote the case of Sir Charles Napier as an illustration of one who was entered very early into the military service and who rose to great distinction, I might, on the other hand, mention the case of Lord Lynedoch, who was second to none of those under the Duke of Wellington's command, and who did not enter the Army until after the age of forty. He was a man who, having had the ordinary training of an English gentleman, did not turn his attention to military subjects until after he was forty years of age, but who then developed those qualities which were no doubt inherent in him. It is for that reason that I venture to demur to what has been said by Colonel Graves, because I think it is very important that our young candidates for the Army should come, if possible, from English schools. We are under very great obligation to Army tutors. In the last Report that was issued on Military Education I drew attention to this, and pointed out that it would be most unjust to withhold from them the credit of having shown very successfully how to prepare candidates for the Army examinations. But it is not on that account that I should disagree with public schools. On the contrary

I should wish the public schools to a certain extent to follow their example. There is a great deal of difficulty in that, and the difficulty is greater than some people suppose. One reason is, no doubt, that the old public schools have such a large *clientèle*, that they are unwilling to meet the wishes of a limited body, as they have plenty of candidates from all classes who are waiting for admission. I was lately speaking to a young fellow in the sixth form of a great public school, and I was asking him about the Army class in that school. At that school they had some very valuable exhibitions which were tenable after they left the school for several years, and one was for mathematics. I said to him, "I suppose the mathematical exhibition is sometimes obtained by a boy on the modern side." "Oh! no," he said, "never." I said "How is that? They have to go especially into mathematics." "Oh!" he said, "they go into mathematics, but only up to a certain point. They only go up to the Woolwich standard; they do not go up any higher." He said the boys who get the exhibitions go higher than that. That is, you see, one of the points which is one great difficulty in regard to competitive examinations. The Army tutors and the public schools say, "You wish us to prepare boys for the Army," and they prepare them up to the point of passing. If they pass, that is sufficient, but they do not care to go one step beyond, because it does not pay. The public schools prepare other boys for the liberal professions generally; they do not wish to prepare them for any special examination, but ground them well so that they may get honours hereafter, and then point to the honours which they gain some years after at the Universities as being to the credit of the school. That is one great difficulty which we find. At the Royal Military Academy the boys are only trained up to the point of passing, and do not go any further. It is a very difficult subject to deal with, and I am bound to admit that I see no way out of it, as long as competitive examinations last; and I do not see any way of doing otherwise than retaining competitive examinations. I believe a much better way of securing candidates for the Army would be to offer cadetships to the sixth-form boys at the public schools. You would by adopting it get a very good class of well-educated young fellows; but it would never be sanctioned. Moreover the pressure to exercise patronage would be most excessive, and therefore I think it is quite out of the question. We are thrown back, therefore, to do the best we can, and I confess, responsible as I have been to some extent for the scope of examination for entrance to the Army for some years, I am prepared to maintain that the present arrangement is the best, and in this I am supported by the Civil Service Commissioners, who, having had great experience in these matters, are entitled to have their opinions duly respected, and I am sure they will always carry weight. I wish to remind you of what was said by a very eminent man in a recent article that was published. I allude to Lord Armstrong, a man who, having begun life as a solicitor's clerk, has ended by becoming one of the richest men in the kingdom, and at the head of an army of 14,000 employés. He said in that article, alluding to the general education of the country: "The present system of primary education has the radical defect of aiming at instruction in knowledge rather than the training of the faculties." That puts into words better than I can do what I am anxious to explain, viz., that the education of a man should not be devoted solely to the acquisition of knowledge; it should be devoted to the training of his mind. You will find that though the man who has been well and thoroughly trained will not appear to go so fast as the specialist at first, yet he will overtake him in the long run, and when he comes up into middle life you will find he is a much more valuable man. I have been very much struck with statesmen and other leading men in this country with whom I have had the good fortune to associate from time to time, to find that in the case of those men who have had the ordinary old education of the public school and university, what a powerful mind they display in dealing with difficult subjects which are entirely new to them. They have such a power of seeing the point at issue. Whatever fault may be imputed to our statesmen, few will deny that they do as a class display an extraordinary power of grappling with the very difficult subjects they have to deal with. I attribute that to the thoroughness of their education in the training of their faculties. I am afraid I am rather transgressing the limits of your time.

and therefore I must not keep you too long. There have been some remarks made by Captain James, and I am sorry he did not remain here to hear what I have to say about them. He made some very stringent remarks about the examiners not having their names published beforehand. Now I think anybody who will consider that subject will see that there is a great deal to be said against it, indeed, more than there is to be said in favour of it. He began by saying that there is no public body in England that does not have the names of the examiners published. I think it would be difficult to prove that it is not the other way. The Civil Service Commissioners are the very largest body of public examiners in this country, and they do not publish the examiners' names on the papers. I believe they did so at one time, but they found it so objectionable that they were forced to withdraw it. Captain James says the examiners cannot be got at; it was for that very reason that it was withdrawn, because when the examiner's name was published, his life was a burden to him. He received letters from mothers and fathers of candidates imploring him not to pluck their sons. It was such a state of things that no examiner in the world could put up with. Even in these days I have had complaints made by examiners of remarks being made by the candidates at the end of their examination papers, such as, "Please be as favourable as you can; this is my last shot." If such a candidate had passed, I think it would have been a question whether he would not have been disqualified for attempting to exercise an improper influence on the examiner. But the examiners are not unknown. In the periodical reports from the Military Education Department the names of the examiners are given in full, with the subjects which they examine upon, so that people are able to judge whether proper examiners have been selected. The Civil Service Commissioners follow the same rule; they publish the examiner's name and the subjects he examines in, and people can then judge whether a proper man has been selected for the subject. Dealing with the former part of the paper, as to Colonel Graves comparing the Army with the Navy, we must not forget that the Navy is a very special service. If men do not begin very young in the Navy they are not likely to come to that efficiency which we expect in our naval Officers, and they do the same for their sailors, that is to say, they deal with boys, and a very large number of them. Few people would say that it is equally desirable that young gentlemen should be trained in camps from an early age with all the surroundings of garrisons or camps in order to make them thoroughly acquainted with military subjects. There is no comparison between the two things. The Navy have another great advantage, that they are always, as it were, on active service. When our sentries walk up and down their only object is to take care that they see the "visiting rounds" as soon as possible. The sailor, on the other hand, has to be on the look-out for all sorts of contingencies; he has to look out for rocks; he has to look out for ships, boats, or anything that may happen; in fact, he is always on active service. That is the great advantage that the Navy has. We cannot compare the two Services in any sense. I only wish it were possible that the Army should have similar training, but that training can only be got at the seat of war, because you cannot possibly get people to take the same interest they would do if their lives were at stake. There is another point I should like to mention. Colonel Graves spoke about the number of candidates for Woolwich and Sandhurst. The actual number for Sandhurst at the last examination was 590 for 121 vacancies, rather less than 5 to 1. The average for the last three years has been a little over $3\frac{1}{2}$ candidates for every vacancy, and for the six years before that rather less than $3\frac{1}{2}$ for every vacancy offered. Those are the exact numbers.

The CHAIRMAN: How is it at Woolwich?

Sir R. BIDDULPH: The proportion there is about two to one. I think I have now trespassed too much on your time. I will only express my thanks to the lecturer for the trouble he has taken in dealing with this subject.

Major-General J. KEITH FRASER, C.M.G.: I fear it is rather presumptuous in me to speak on this subject immediately after the gallant General, with whose opinions about public school education without any technical instruction for boys intended for the Army, I am afraid to differ. The gallant General himself, I think has shown proof of the advantage of technical military education. Unfortunately no such opportunities came in my way. I can only speak of my own experience.

I was at a public school, the public school indeed of which the Duke of Wellington is said to have spoken so highly. When I left that public school I knew very little indeed which has been of the slightest use to me as a soldier ever since. I learned no French nor any living language, and I learned no arithmetic. I certainly did not learn to read or write. I learned indeed how not to write through having to do many written punishments. In those days we had to set ourselves, after leaving a public school, to the study of foreign languages abroad, and to spend most of our later lives in trying to educate ourselves in matters which we ought to have learnt before entering the Army. Before that, and for many generations, I do not think the English Officer, under that system, was a very uneducated man. I think the higher ranks of the Army held many very highly educated men. The Duke of Wellington had under him men who spoke foreign languages, and men who were great military scholars, not only Lord Lynedoch, who has been mentioned by Sir R. Biddulph, but others—General Craufurd, who was no inefficient General. He could speak French and German, and was indeed a past-master in these languages. He studied the art of war in Germany under Frederick the Great. The fact was Officers had to teach themselves, as men do now who have been at our public schools, after leaving them, in all matters connected with their profession. It has been my deep regret all my life that I had not had any military education. I am not one of those parents who make up their minds late what their sons are going to be. I always meant my boys to be soldiers, and I sent them to public schools thinking that was the right thing to do, and that in these later days they would learn something useful. I sent one to a public school, at the laying of the foundation stone of which I had been present, immediately after the Crimean War, when we were all very keen about military education. I thought that school had been established as one where boys would be taught military matters, and would learn everything necessary in the way of a good military education, and be able to follow the footsteps of the great General whose name that school bore. I sent my boy there with that firm belief, and I must say I am very grateful to the school for two things: he was taught to swim and he was taught to fence, both excellent things in their way; but as far as military education was concerned, I do not think he knew anything until he went to those much-abused gentlemen, who I have been very pleased to hear praised to-day, I mean to the “crammers,” men who know what to teach and how to teach it. I only wish that such men taught at our public schools. As to foreign languages, I do not think they are taught for any practical use at public schools. There is only one other matter I should like to speak upon, that is, about the standard of education required of non-commissioned officers. I do not think that a very high education is an absolute necessity for a non-commissioned officer. I think if he has a simple general, combined with a thoroughly good technical, education, that is sufficient. We must not put education too high. In foreign countries, a non-commissioned officer is a man who has great technical knowledge; he must know all his duties thoroughly, but he does not have to pass stiff examinations late in life. The reason which Sir Robert Biddulph has given for the necessity of gentlemen having a good general education, namely, that they come into contact with statesmen and others, does not certainly apply to non-commissioned officers. I do not think it is necessary for non-commissioned officers who have very trying duties to perform, with perhaps hardly a minute to spare in the day, that they should pass very high examinations in history, in geography, and those sort of things. A non-commissioned officer, say, a cavalry sergeant-major, has very hard work to perform. He may know his duties admirably well; he may look after men and horses most efficiently; and every one of us knows that a sergeant-major who does his duty has very little time to himself, and that even if there is a school to the barracks, which there is not in many cases unfortunately now, he has not much time to educate himself; but in order to pass an examination for promotion he has to know about things such as the “Self-denying Ordinance,” the “Act of Supremacy,” the “River System of Africa,” and he has to answer those sort of questions before he can be a regimental sergeant-major. Now I do not think a regimental sergeant-major need know anything at all about the river system of Africa or the Act of Supremacy, and in no army in the world but ours would such knowledge be required. I wish, indeed,

we had less of these educational examinations. It very often happens that a man may be thoroughly efficient in every way, but ignorance of such subjects as those I have mentioned just prevents him from getting to the top of the tree. I have an instance in my mind of the best man who could possibly be found for a very high position, a man, in fact, who had done the duties during the absence and illness of the holder of the appointment for a long time, but he was passed over because he had not a first-class certificate. He had no school to go to, and certainly no time to go to one even if he had had one. It was far too late in life—he was thirty-eight years of age—to commence learning about English history, the geography of the world, &c. I only wish to say these few words. I do not think a high-class education or stiff examination are everything for a soldier, and I only wish before an Officer came into the Army that he could learn something of his profession. I do not think an Officer should be put to try to teach his men if he has to learn it all himself, perhaps from them, as is generally the case now.

Lieutenant-Colonel E. GUNTER: We are, I think, very much indebted to Colonel Graves for the admirable lecture he has given us, and for drawing attention to this most important subject. As a special Army tutor, I beg to thank him for the courteous way in which he has spoken of our efforts, and Sir Robert Biddulph and the Officers for having kindly recognized them. As regards the question of special or general education for the Army, I agree with Sir R. Biddulph, that a good general education is what is wanted, but I think early training is necessary, and one point ought to be particularly attended to by schools preparing young men for the Army, that is, closer training in mathematics. I do not speak of higher mathematics, but more thorough training in arithmetic, algebra, &c. Unless these things are thoroughly taught in the first instance, it becomes a matter of difficulty later on. Officers are frequently called on in the course of their duties to make accurate and rapid calculations, and unless they are early trained to habits of accuracy, their after-education is impeded. With regard to some of the points touched on by Captain James, I agree with him that there should be only one textbook as the authority on fortification, and as Chatham is the seat of learning of that branch, it seems natural that the book in use there should be the one. I hope the Director-General will permit me to allude to the necessity for a new synopsis for Sandhurst, and for the Militia competitive. The present one has been a very long time in existence. It is very desirable that the exact subjects on which the examination will be held be made known, so that the training of Officers be thoroughly carried out. As regards the education of Officers in the Army, I agree with all that Colonel Graves has said. I think the fact that Captain James alluded to of your Officers coming up in much fewer numbers for coaching for promotion, is a good deal to be attributed to the garrison instruction classes. Colonel Graves recommended towards the end of his lecture that special classes should be held at garrison centres for the instruction of non-commissioned officers. The Director-General of Military Education has not lost sight of this point, for these classes have been held by Garrison Instructors (now D.A.A.G. for Instruction) since 1884. There were twelve non-commissioned officers of cavalry and infantry, and they were put through exactly such a course as Colonel Graves recommends. The course lasted one month (I think it now lasts six weeks), and the results, especially as regards cavalry non-commissioned officers, were most satisfactory. The men took the greatest interest in the work, and, I have no doubt, it has borne fruit. Further, the whole of the non-commissioned officers and company Officers of the infantry in garrison were put through a regular course of field works to assist them in their "military training" by two companies at a time, the Garrison Instructor giving them first a day's instruction indoors, by lectures and models, and afterwards five hours' practical instruction outside. Afterwards, that is, later in the year, they were put through a higher course of practical field works, under the Commanding Royal Engineer. I think, therefore, progress has been made in that direction.

Commander SULLIVAN: As I think I am about the only naval Officer present, I rise to say I feel very proud of the way in which the Navy has been spoken of, and I hope we shall always deserve the high opinion expressed. With regard to what has been said in the course of the discussion, as to taking all the military Officers from sixth-form boys, I do not think a Naval Officer would have very

much chance in general of getting any of his sons into the Army if that were to be the qualification, for few would have money enough to keep them at a public school until they got up to the sixth form. Therefore that might be rather a drawback to the proposal, from a naval point of view.

The CHAIRMAN (General Clive) : Following the rules of this Institution, I will make a few remarks, and then Colonel Graves will reply. The discussion has been interesting. Captain James has replied for the Army tutors, and Sir Robert Biddulph has traversed the whole ground and has given exactly the reasons that have actuated the Director-General's Department in the course they have taken; and Major Watson has answered for the engineers. Colonel Graves wishes to devise a system of education which (1) shall enable boys to get into the Army without changing their place of education; and (2) shall be advantageous to them when they are serving. He has therefore so divided his recommendations. It seems to me that no system of education can possibly be devised which will answer the first of these requirements, unless all educational establishments make entrance into the Army their first object. The difficulty of getting into the Army is not caused by the want of a sound education, which can be got at any public school, but results from the competition of candidates, under which 75 per cent. of those who compete are unsuccessful. The changes, therefore, suggested by Colonel Graves will not answer their object, because, however military and sound the public school education becomes, if one out of four boys only is wanted, and if he be selected by examination, there will always be special instruction provided by other tutors, to whom ultimately the candidates will turn to improve their chances of success. What causes this extravagant competition? The professions in this country for a young gentleman are limited in number. A father who wants to choose a profession for his son has only certain choices to select from. Colonel Graves has alluded to the greater efficiency of Naval to Army Officers in professional knowledge. I quite agree with him, but thinks that this is due to the different conditions of the Service. But it is too late to enter the Navy. The father must, therefore, either put his son into business, which is expensive—or into Orders, or to the Bar, medical profession, or make him an engineer. The boy probably does not want to be a doctor or to take Orders; the Bar, though it possesses distinction and prizes, is overstocked, and the result is there is nothing left except the Army. What then are the advantages the Army gives? I am trying to point out what causes the difficulty, the extravagant competition. In the Army as soon as a young fellow joins his regiment, whatever his character or disposition may be, whether surly or bad tempered, whether he has social or other virtues, immediately he puts on Her Majesty's uniform, he is considered to be a gentleman—he can go where he likes, do what he likes; he is welcomed wherever he goes; he sees the world; and with reasonable good health and chance of promotion he can finish with a pension of 420*l.* a year. I will ask any gentleman here, whether father of a family or not, does he know any other profession in which you can show as good a result for a pleasant life? That is the reason everybody crowds into the Army. For Sandhurst we have 500 or 600 candidates—100 or 120 to be selected. For these we may demand certain conditions in height, health, and character. If the successful candidate is to be a good Officer he should have good decision, common sense, nerve, and talent. Now comes the question of his education for the Army: Colonel Graves wants the boy to begin early; at fourteen, to learn fortification, mathematics, military work, &c., while Sir Robert Biddulph says "Give him a general education." Now I agree with Sir Robert Biddulph. If you look at the ordinary duties of an English gentleman's life, public or private, a good public school education is the most suitable, as it is for the Army if he can get into it. I believe that, at Sandhurst, where I have the honour to serve now, we are perfectly able to give that boy so good an education that when he joins his battalion he will be able to take to his duty. We cannot make him love reading, but we can teach him what he is to read and give him the rudiments of what he will have to learn. Of course it stands to reason during the short time that boys reside at Sandhurst, the military practical education cannot be very thorough except for gifted lads; but such as are likely to be good at topography, or at field fortification, or good at tactics or law, have plenty of opportunity for

success. Next term we shall have residence prolonged to $1\frac{1}{2}$ years for all Cadets, and when they join their regiments I quite expect the Colonels will say that they are suitable young fellows for them. I believe the Colonels of regiments will bear me out in saying that the kind of boy they want to join their regiment is a fellow good at athletics, sharp, smart, and who has been at a public school. Therefore, I prefer the present system. I do not think it will be worth while for me to go into the Staff College course now. The conditions of the Staff College education make it most difficult to become a course which shall be suitable to Officers from different branches of the Service, with widely varying attainments, who have to undergo an uniform course which closes with a qualifying examination, whereas they entered under a competitive examination. I believe we are all trying to do the best for the Service. I believe the most suitable man for the British Army Officer is he who is healthy, strong, who can ride, who has got nerve and decision and common sense, and who is fond of sport. We can teach him well enough what he will want to know on joining, and when he joins his regiment I am satisfied that Colonel Graves, or any other Commanding Officer who follows on Colonel Graves' lines, will do the rest for him.

Colonel GRAVES (in reply): I must not keep you long: two or three words will suffice. Major Watson, speaking of what I said with reference to the School of Military Engineering, complained that I did not give the whole of the subjects that the young gentlemen were put through. Well, that may be, but what I want to emphasize with reference to this establishment and work is that their method is a singular exception to the methods and systems of every other branch of the Service in this, that they are without examinations to test the knowledge gained at the end of their long course of two years. That Major Watson has not denied. Further, that they send their Officers there immediately after joining. In my paper I asked the question, "Is it wise so to do?" I am still of the opinion that it is not wise. The engineer Officer has had a very trying time at school preparing for the competitive examinations at the Academy. He has had a very hard time at the Academy, striving to get into the first few on the list passing out, so as to ensure getting into the engineers; and forthwith, after so doing, he is sent straight away to school again, to go through a very drastic course indeed at Chatham, and I am in possession of letters from Officers of experience in the engineers now serving at Chatham, taking a totally different view from that expressed by Major Watson here to-day. I do not think it is wise to send these boys there so early, and I would emphasize the fact that it is not so in the Line; it is not so in the artillery. And in reference to India, the Government insist on engineer Officers going through another instructional course on professional subjects before they get permanent employment in that country. Of course Major Watson would not have been worth a button in building a fort if he was sent straight away without going through that course, but the authorities would have no business to send a boy under such circumstances. All the more fools the authorities if they did so. I do not think his argument with reference to that touched the point at issue. With regard to the remarks of Sir Robert Biddulph and the Chairman touching the public schools, I cannot help—if I may with great diffidence put it before you—I cannot help feeling that when you bring statesmen into the question, and where you quote them as examples for a certain line of action, you, I would respectfully submit, are arguing from the exception to the general rule, which, I think, is not the wise course to pursue. I maintain most distinctly and dogmatically that it was the utter weakness and utter failure of our public schools to finish off the education of the young candidate for the Army that brought this host of Army tutors into existence. Let me argue *ad hoc*. I maintain as strongly and as dogmatically that if the public schools will finish off their own candidates for the Army, then the Army tutor may die a natural death. The Army tutor need have no status whatever if the public schools will teach their boys properly and put them into the Services themselves. It is a fact which is beyond controversy that hundreds of boys are taken from our public schools year by year and sent to Army tutors because the public schools do not give the necessary finishing touches to their education. Sir Robert Biddulph said, if the education of the boy is made special to the Army at a very early age he loses man

advantages. I agree with Sir Robert Biddulph up to a certain point. That a general education is necessary as a foundation, that a classical education is necessary as a foundation to modern languages, everyone knows, and so on, and I nowhere advocated the teaching of military subjects only. But the point I wish to put clearly is this, that the naval Officer who has had a very early education for his profession is not thereby made, if I have understood Sir Robert Biddulph aright when speaking of military Officers, incapable of leading men afterwards. Again, as by his very early education he has not been disqualified from associating with those of equal rank and birth in the life that he himself comes from,—for I maintain that our naval Officers are acceptable in every port in the world wherever they go, and are always more popular than those of any other service in the world,—I maintain that the education of their early youth has not in any way militated against their polish as gentlemen and against their social position afterwards.

Sir ROBERT BIDDULPH: I must protest against having been supposed to say anything to suggest that. I have so many friends in the Navy!

Colonel GRAVES: The point was, I think I am right in saying, that in the Army—

Sir ROBERT BIDDULPH: I did not say a word with reference to the Navy about that, about the boys being trained up apart from other boys. I left it quite open.

Colonel GRAVES: I know you did not; but I think you said if the Army candidate was so trained, it would have the result that they would not be fit for society, &c.

Sir ROBERT BIDDULPH: No.

Colonel GRAVES: I am very glad. I think there was an impression in the meeting, as well as in my own mind, that that was rather intended. I maintain that early military education need not separate Officers socially from the statesmen of the future that may be at school with them any more than in the case of naval men. There is nothing more for me to say with reference to the criticism that has been offered. I agree most firmly with Sir Robert Biddulph and with our Chairman, that we should get our candidates from the public schools. I believe the boy at the public school is a better boy in many ways, both socially and from the athletic point of view, and from general largeness of mind and idea, than the boy who has been brought up in a cramped sphere. But there can be such a thing as a model school, and I believe our public schools should be arranged to meet the special purposes in life of the pupils, and should train the boys from early youth on those lines, without their being separated from those who will afterwards be statesmen, and so losing something in the way of social power and influence.

The CHAIRMAN: I think we may propose a vote of thanks to Colonel Graves for his interesting lecture and the discussion to which it has led.

Wednesday, May 11, 1892.

ADMIRAL OF THE FLEET SIR GEOFFREY T. PHIPPS HORNBY,
G.C.B., First and Principal Naval Aide-de-Camp to the Queen,
and Vice-Patron of the Institution, in the Chair.

THE PLACE AND USES OF TORPEDO-BOATS IN WAR.

By W. LAIRD CLOWES, Gold Medallist and Hon. Life Member of the
United States Naval Institute.

SOME months ago, in this Theatre, I heard a verbal invitation conveyed to an Officer to read a paper here on the subject of torpedo-boat warfare. As that Officer is not only a recognized expert in that branch of naval theory, but also a Gold Medallist of this Institution, I allowed myself to hope that he would see his way to doing as he had been asked; and for some weeks I looked forward to seeing in the papers an announcement of the title and date of his lecture. To my great regret I did not see it. Instead, I was myself honoured with an invitation from the Council to read a paper on "The Place and Uses of Torpedo-boats in War," and although I am very deeply conscious of my lack of competency for the task, I am so sensible of the importance of the subject, so desirous of seeing professional attention drawn to it, and so anxious to hear it fully discussed by those who are best qualified to discuss it, that I gratefully agreed to do my best. The action of the Council in thus requesting a layman to place his views and theories before them is, believe me, a compliment which I thoroughly appreciate.

Before I go any further, I feel that I ought to explain my position here; for no sooner had this lecture been announced than Admiral Long asked me, "Where did you graduate in torpedo-boat warfare?" And, no doubt, the query that occurred to the late Commodore of the "Red" Squadron must have since occurred to others. Well, I have tried to read everything that has been written on the subject; and I have tried to see everything that has been to be seen in connection with the subject, since the year 1885, when, as a passenger in the great fleet which was then commanded by Sir Geoffrey Hornby, I first witnessed something of the behaviour of torpedo-boats at sea. Since that year I have been provided with very numerous opportunities, not only for going to sea to watch torpedo-boats, but also for going to sea in torpedo-boats, in all kinds of weathers, in all types of boats, and in

several different parts of the world. I have been in them during trial trips and during manœuvres, by night and by day, and under several flags. I have been in torpedo-boats when attacking ships and in ships when attacked by torpedo-boats. And thus I have managed to acquire certain views which, I may fairly claim, are based upon experience. But I have, I think, derived even more advantage from conversation and correspondence with Officers who have had experience in this most interesting branch of their profession. And here I should like to remark that neither in our own nor in any foreign service does it seem to me that there is a more able, enthusiastic, scientific, keen, and devoted class of young Officers than the class which specially busies itself with torpedo work; and that, although I have seen much of the striking ability, resource, and keenness of American, German, and Austrian torpedo Officers, I believe most sincerely that in no Officer-like qualities are our own torpedo Officers excelled.

In thinking over my subject, I have become aware that it is one which has a peculiar tendency to grow to very wide and—for the purposes of a lecture here—unmanageable proportions; and I have therefore come to the conclusion that I must limit it as much as possible. I do not, in consequence, purpose to touch upon such questions as “What is the proper building policy for this country to pursue with regard to torpedo-boats?” or “How shall we find men of the sort requisite for efficient torpedo-boat service?” or “What is the best defensive policy for a fleet or a ship in presence of, or threatened by, torpedo-boats?” These are, I dare say, fit subjects for special lectures; but if I ventured to touch them, I should not have time in which to deal with even the fringe of my own proper subject, “The Place and Uses of Torpedo-boats in War.” In one direction only do I purpose to allow that subject to extend itself. In considering the conduct of torpedo-boats in war, I cannot altogether refuse to consider the question of their conduct in peace; for I think that I am entitled to assume that, until a place and a use for torpedo-boats shall have been discovered and experimented with in peacetime, torpedo-boats must be comparatively useless for the operations of war.

I am going to take it for granted that we have the best torpedo boats that we can obtain, and that we have them at our command in peacetime. Typical of the best boats are the new 130-foot craft (Nos. 82–87), which were supplied a couple of years ago by Mr. Yarrow to the British Admiralty, and which have an extreme speed of 22·5 knots; the new Elbing boats, Nos. 75 and 81–96, which have been ordered by Germany, and which have an extreme speed of 26 knots; the new 24- and 25-knot boats of Messrs. Thornycroft, Chiswick; the new 25-knot French boats; the boats which Mr. Yarrow has built for the Argentine Government, and which have an extreme speed, with a 14-ton load on board, of 24·45 knots; and last, the proposed 160-foot Yarrow boat with which, so Mr. Yarrow tells me, a speed of 27 knots, with a load of, say, 25 tons, can be promised. I premise the same thing with regard to torpedo-gun-vessels, viz., that

have the best that can be built. So long as it was supposed that the excessive vibration of fast craft was in some way due to lightness of scantling, we could not reasonably expect torpedo-gun-vessels in smooth water to be quite as rapid as 1st class torpedo-boats which have, proportionately, smaller weights to carry. But since Mr. Yarrow has demonstrated, as he did in his interesting paper read last month before the Institution of Naval Architects, that we must attribute vibration not so much to lightness of structure as to ill-balancing of engines, and since he has shown how to overcome that difficulty, we may hope to have torpedo-gun-vessels able, even in the smoothest water, to steam as fast as all but the very fastest class of torpedo-boats, and easily able to beat, in a slight sea, any torpedo-boat that has yet been designed. Writing to me, Mr. Yarrow says: "How much speed can be got in a torpedo-gun-vessel of 1,000 tons displacement will depend entirely upon what is sacrificed to speed, seeing that everything is a compromise, and that all depends upon the value that is attached to the various qualities of coal-carrying capacity, weight of armament, weight of machinery, weight of hull, &c. But I certainly do not at all see why, with due regard to other qualities, speed, say, of 23 or 24 knots should not be obtained. This I feel as sure of as I can be sure of anything." Having made these preliminary remarks, there is nothing, I think, to take me again from my proper subject. Much of what I shall say is taken from my paper contributed to the April part of the Proceedings of the United States Naval Institute.

In the early days of torpedo-boats, these craft were regarded as proper companions for a fleet at sea. In 1885, with the Particular Service Squadron, there were six of the 87-foot, and two of the 113-foot boats, each one being attached, during the greater part of the manœuvres, to a big ship, and drawing from her the needful supplies of coal, water, food, and stores. I believe it is admitted that at sea these boats were failures. They could sometimes make so little progress that they delayed even ships that had a sea speed not exceeding 10 knots; they were a continuous source of trouble and anxiety, and they were abodes of misery to those who were in them. So wearying and exhausting, indeed, were they to their companies that, had it been a case of real instead of sham warfare, I doubt whether the people would have remained physically capable of displaying that extraordinary watchfulness and nerve without which torpedo-boat warfare can never be successfully conducted.

On the 9th and 10th of June, while steaming at a very easy speed on a calm sea, three of them broke down. On July 11th, off the north-west coast of Ireland, in a brisk breeze from the westward, the senior Officer in charge of four of the boats had to request permission to take them all in shore. And on July 17th and 18th, during half a gale in the Irish Sea, some of the boats behaved so badly that their crews, able neither to eat nor to sleep, and overtaken by most alarming sickness, were completely worn out and prostrated. What was attempted by England in 1885 was attempted by France in 1886, and in the following years by both nations. The British, having

found that their 113-foot boats were not sea-keepers, tried 125-foot, 127½-foot, and 130-foot boats. The French tried an even greater number of types, ending with the 151-foot boats of the "Ouragan" class. But long before the series of experiments had been carried far, it was pretty generally recognized that the torpedo-boat, as distinct from the torpedo-boat catcher or torpedo-gunboat, was unsuited for keeping the sea; and that if sea-keeping torpedo-vessels were required, they must be of 250 tons displacement at least, and might, with advantage to the comfort and condition of their crews, be considerably larger. This conclusion had the effect of creating a new species of small craft, midway between the torpedo-cruiser and the torpedo-boat. To the new craft, the torpedo-gun-vessel, has been assigned most of the work which it was originally supposed the torpedo-boat was capable of; and the torpedo-boat, being no longer needed to serve as a scout and dispatch vessel, fell into some neglect until her merits and her potentialities were developed in a new direction, first, to a slight extent, by the Germans, and then, especially during the Naval Manœuvres of 1890, by the British.

What may be called the new view of the proper functions of the torpedo-boat regards that little craft as merely a quick and decisive raider from a base, and not as a vessel from which any kind of sustained effort must be demanded. The torpedo-boat's business is to strike like a bolt from the blue in the most unexpected quarters; to be always in perfect readiness for a few hours of rough hard work under extreme pressure; to appear unannounced in distant places; to vanish unpursued and unseen; and never to expose herself unnecessarily either to the violence of the sea or to the attention of the enemy. I don't want to trouble you with the history of recent naval manœuvres, British and foreign, or with that of the attack on, and sinking of, the Chilian Congressionalist ironclad "Blanco Encalada" last year. I assume that all this is fresh in the minds of most of you. To my mind all the facts that we have concerning the employment of torpedo-boats either in peace or war tell in favour of the principles which I have just briefly enunciated, viz. that the torpedo-boat must be regarded not as a sea-keeper, but as a dealer of sudden and unexpected blows. Neither must she be looked upon as a craft suited for an action of the ordinary kind. During the Chilian troubles the Congressionalist armed transport "Aconcagua" easily beat off the torpedo-gun-vessels "Almirante Lynch" and "Almirante Condell," which, as regards gun power are of course much more formidable than any mere torpedo-boat can hope to be, and seriously damaged one of them. These craft committed the error of looking upon themselves for the time being as firers of shells instead of as firers of torpedoes; and I imagine that the experiment which they tried was so conclusive as to prevent in the future any torpedo-vessel from deliberately seeking an encounter, upon equal terms and in daylight, with a vessel tolerably well armed with machine and quick-firing guns.

Secrecy and suddenness, then, are desiderata of prime importance for the success of a torpedo attack. Equally important are organiz-

tion and training. The descent upon the Fleet at Plymouth in 1890 was made with sufficient secrecy and suddenness; but neither the organization of the flotilla nor the training of the ships' companies engaged was what it should have been. An Officer who took part in the affair lamented to me that Lieutenant Sturdee's division of six boats was too large to admit of being properly kept in hand by a single Commander; and another Officer informed me that many of the Lieutenants in command of boats had gone on board without proper instruments for the navigation of their craft in case of the separation of the flotilla; that the engine-room complements were not familiar with the machinery; and that the discharge of the torpedoes took place in some cases with undue haste and flurry. These were the naturally resultant faults of incomplete organization and training. Similar causes led, no doubt, to the large number of failures to run during the British manœuvres of 1891, and to the numerous misses and failures of the Chilian war. One has heard of torpedoes having been fired before they have been tested for floatability, and even before they have been charged with air; and I myself have seen a torpedo picked up with its water-tripper jammed in such a way that it could not possibly have acted. Accidents, oversights, and follies may always occur in connection with operations like those which are now under consideration; but system will reduce to a minimum the liability to any of these, and I shall now endeavour to suggest a system of organization, training, and war tactics which appears to be logically suggested by the experience of the past.

In order to be able in war-time to properly utilize torpedo-boats for a descent such as was made upon Plymouth in 1890, a naval Power should, I am convinced, keep the greater part of its torpedo flotilla perpetually in commission. I do not mean that each boat, where there are considerable numbers of boats, need be kept in full commission with, as in the British Navy, her Lieutenant, one or two Sub-Lieutenants, and a gunner or boatswain on board. But the engine-room staff, since it can never know too much about the boilers and machinery, should be always attached to the craft, and should be given frequent opportunities of perfecting acquaintance with its delicacies and its peculiarities. The executive and navigating staff require no such special and intimate knowledge. One torpedo-boat may be navigated and fought very much like another. Her idiosyncrasies—or, at least, her important ones—reside entirely in her boilers and machinery. While, therefore, each boat, if she is to be employed to the greatest advantage, must have an engine-room staff that is thoroughly accustomed to her, any competent navigator or any competent executive Officer would serve almost as well as one who had been born and bred on board. It would be enough, in ordinary peace-time, to place a trustworthy Warrant Officer in charge, and to leave him there as Second or Third Officer upon the full commissioning of the boat for manœuvres or war.

But a single boat should never, for any purposes, be regarded as an independent unit. What the unit in torpedo warfare should be is still a matter of discussion. In infantry tactics the battalion is the

unit; in artillery tactics it is the battery; in torpedo-boat tactics it must be the division; but battalions and batteries are not in all armies of the same strength, nor even in particular armies are they always invariable; and the same is the case with torpedo-boat divisions. The German division, for example, consists of six 1st-class boats and a "division boat"—a vessel of 300 or 400 tons displacement, of great speed, and of characteristics generally resembling those of the *avisos-torpilleurs* of the French Navy, or of the "torpedo-gun-vessels" of the British. In England the division has contained six, four, or three boats, with or without a torpedo-gun-vessel attached. In France also the constitution of the division varies, or has varied. Professional opinion now, however, seems to incline in most countries in the direction of the division of three boats, with, if possible, a larger craft to carry the Divisional Commander, to lead the navigation, to undertake the repair of small defects, to provide supplies of water, coal, and stores, and, in short, to act for brief periods as a small *mère cigogne* to her consorts. Where three boats to the division are not advocated, two appear to meet with more favour than four, and four with more favour than five or any greater number. British Officers of experience almost with one accord advocate three, with a larger craft; and I shall confine myself to the consideration of the division as thus constituted, for I believe it to be far and away the best.

The peace "state" of such a division would include a full complement for the larger craft (which would be commanded by a Lieutenant, with a Lieutenant for navigating duties, a Sub-Lieutenant a Chief Engineer, a Surgeon, and subordinate Officers under him) and reduced complements (consisting only of a Warrant Officer and engine-room staff) for each of the three boats. The Divisional Commander would thus have at his disposal sufficient Officers and men to enable him to keep his division in good order and training and to continually exercise part of it along the coast in the neighbourhood of his headquarters. But he should by no means be the sole director of its operations. An Officer of superior rank (a Commander or Captain) should be appointed to a small cruiser as Inspecting Officer, and should be empowered and required to visit a divisional headquarters unannounced, and, by day or night, to mobilize the divisions, manning them up to full war complement from the ship's company of his own vessel, and then exercising them at manœuvres at full speed. If, for example, a division had its headquarters at Portland, an Inspecting Officer arriving there unannounced by night would teach valuable experience to the command by mobilizing it, and despatching it in all haste to Guernsey, Penzance and back. The celerity, ease, and absence of mishap with which the operation should be carried out would to a large extent measure the efficiency of the division for the kind of work which it would be put in war-time.

And here I may fitly state some of the arguments in favour of adding a "division boat" or torpedo-gun-vessel to each division. Every one who has had much experience at sea in torpedo-boats knows how

very limited is the horizon from the low deck of so small a craft, and how difficult, especially in bad weather, is the navigation of her. A vessel with a mast of some kind, and with a proportionately wider horizon, can keep a far better look-out than any torpedo-boat, and so avoid dangers that the torpedo-boat may easily fail to discover until she is close upon them. Again, the larger vessel, being roomier and steadier, can take observations and conduct navigation with much greater facility than the smaller one, and may, in fact, "make" the navigation for her consorts when they cannot readily make it for themselves. But this is by no means all. The inevitable delicacy of torpedo-boats renders them particularly liable to slight, but not insignificant, damage by collision and other accidents. A "division boat" can carry appliances for the remedy of innumerable small defects either in hull or in machinery. She can also tow a more seriously injured craft; render effective help to the crew of a foundering one; serve as hospital to her division; make a lee for the protection of her consorts; shield them until the critical moment from the observation of a careless enemy; cover them with her guns; and render them a thousand small offices of value, besides inspiring them generally with confidence.

So numerous are the advantages attendant upon the action of some kind of a division boat with the division, that, in my humble opinion, a division should never venture far without having one either with it or close at hand. But such co-operation may, of course, be at times impossible, owing to scarcity of vessels or to the inability of division-boats to leave blockaded or narrowly-watched ports; and even in the best provided country there may be a local, where there is by no means a general, scarcity of torpedo-craft, for it is easy to conceive of any given port being so carefully guarded as to render it hopeless for any regular torpedo-flotilla to issue from it with the object of attempting a sudden blow. Single vessels might escape and take refuge temporarily along the coast until they saw their opportunity to strike, but they might be unable to arrange any combined attack and might be reduced to operating independently. This would deprive them of much of their value; and, therefore, I confidently anticipate that in the next war, wherever it may occur, means will be devised to facilitate the concentration and combined action of torpedo-boats in spite of any system of observation or actual blockade that may be established by the enemy.

Devices of this kind would not facilitate the co-operation of division-boats, save in countries which are exceptionally well provided with a network of canals of some depth; but they might, in all civilized countries, ensure the complete mobility of torpedo-boats not exceeding about 50 tons displacement, and they might, moreover, enable the blockading fleet to be effectively attacked from the most unexpected quarter, namely, from seaward.

In 1887 experiments were made in France to test the transportability of torpedo-boats by railway. The first-class torpedo-boat, No. 71, was sent overland from Toulon to Cherbourg in August of that year. The special train which carried it consisted of three

carriages, two freight cars for the armament, two more freight cars for the stores and gear, and a series of specially-constructed trucks for the boat itself. The boat measured 108 feet long, 10 feet 8 inches broad, and 9 feet deep, and, at the time of transit, weighed 38 tons. It reached Cherbourg in four days, but it did not travel by night; and so it may be assumed that, had promptness been necessary, it could have covered the distance of about 700 miles in 48 hours, or less. The cost of the single experiment was at the time stated to be but 1,400*l*. In the total, the expenses of the specially-built trucks was, of course, a very large item. A full account of this interesting experiment will be found in the "Marine Rundschau" for April, 1892.

What could be done in France could be done with even greater facility in Great Britain. Boats blockaded, or watched, say at Portsmouth, could, in a very short space of time, be transported by rail to Bognor, on the one hand, or Swanage on the other, or even to much more remote places, whence, having awaited a favourable chance, they might operate with deadly effect, and probably with comparatively small risk, upon the rear of the hostile fleet. The only special appliances that would be requisite would be the trucks, and at each end of the distance a short branch line of rails running from the existing railway into the sea. The trucks could be built in three days; the branch lines could be laid in as many hours.

Probably no attack would have better prospects of success than one conducted in this way; for it might be made from any one of a hundred different quarters, and it would be obviously impossible for any fleet to watch all the points from which the boats might be launched upon their mission. But the case which I have imagined is an extreme one. Effective blockades are growing every day more and more difficult. In August, 1888, I was with the squadron consisting of the British vessels "Warspite," "Iris," and "Severn," which, without being observed, and with the greatest possible ease, escaped from Bantry Bay, in spite of the attempted blockade of the comparatively narrow-mouthed haven by seven battleships, seven cruisers, and six torpedo-boats. Save in the face of perfectly overwhelming outside force, a well-handled torpedo-flotilla, constituted either as a division or otherwise, should always be able to operate from a port like Portsmouth or Plymouth, and to strike with the requisite suddenness. It would be from more open ports, or from ports with only one narrow entrance, that effective surprises would be really difficult.

And this leads me to the consideration of the three kinds of torpedo-boat attacks which seem to be permissible in the warfare of the future. These are:

- a. Attacks from a base against an observing or blockading force that is close at hand.
- b. Attacks against fleets or single ships cruising at sea at a distance.
- c. Attacks against fleets or single ships at anchor, close at hand, or at a distance.

Attacks from a Base against an Observing or Blockading Force that

is Close at Hand.—This is the form of attack in which the co-operation of the division boat may, with the least disadvantage, be dispensed with. The approximate position and strength of the enemy are known. The superior horizon of the division boat is, therefore, not required; neither is that craft likely to be so urgently needed to serve as a magazine, store-ship, and refuge for the division, as in the case of operations conducted from a distant base. I do not think that the number of vessels constituting the hostile force should influence the number of torpedo-boats to be employed. French tacticians have suggested that in the attack at least three boats should be devoted to each ironclad; but I would use not more than three boats in any attack, whether against a single ironclad or against a whole squadron. A greater number cannot easily be controlled by a single directing intelligence upon the spot; and if I had at my disposal more boats than three, I would utilize them, not in one solitary onslaught, but in a succession of attacks, by divisions of two or three boats operating from different quarters, at times laid down beforehand by a superior authority on shore. An attack in numbers would inevitably lead to confusion, and probably to collision and damage; and for this reason I would not allow even a division of three boats to attack simultaneously *en masse*. The whole secret of success in torpedo warfare must lie in the wise utilization of those moral effects which are produced upon nearly all men by the unexpected, the terrible, and the vague; and in order to utilize these to the greatest advantage, my boats, as well as my divisions, should go into action successively. One would be naturally tempted to select for attack the leading or rearmost ship of the enemy. To choose the centre vessels of a column would be to expose the boats to a concentrated fire from several craft. On the other hand, the leading and rearmost ships, realizing their relatively exposed position, would be apt to be keeping a better look-out, and to be more prepared than the others. On the whole, therefore, I am inclined to think that the best procedure is to adopt such tactics, by way of commencement, as will disorganize the enemy's preconceived ideas, and to then act as prudence and the situation may have suggested.

And here I would say one serious word which applies to all torpedo attacks. Every contingency must be arranged and provided for beforehand. When the undertaking has once been begun, the time for revision of schemes has passed away. In presence of an enemy, torpedo-boats cannot signal to one another without danger of betraying themselves; and they must, therefore, be prepared to do without signalling. But this does not, of course, imply that a single cast-iron plan must be adopted and rigidly adhered to. Alternatives may, without difficulty, be prearranged, and their adoption may be made to depend upon the condition of the sea, or of the light, or upon the motions of the foe. But it must be remembered that the slightest glimmer from a lantern, the striking of a match, or the weakest suspicion of flame above the top of a funnel may render abortive all attempts at surprise.

A fleet engaged in blockading or watching a port may be disposed

in any one of a hundred different ways, and is almost certain to be at night in a formation different from that which it maintains by day. But it should nearly always be possible to ascertain something of its habits. There will probably be an inshore squadron of light craft and cruisers, while outside will be the battleships and other heavy vessels. The quarry should, of course, be the heavy vessels; and the initial problem for the attack is how to avoid the cruisers. The problem almost solves itself if the idea of transporting the boats by railway to some unsuspected and unwatched base be made use of. If that project be impracticable, the boats must feel their way out as best they can; but those boats which are to immediately co-operate must, at all hazards, keep together until they have passed the inshore squadron. I mean that if one division only be employed, it must not, on any excuse, separate until it is quite certain that the whole of it has got through, and is available for the prearranged work. If two or more divisions be employed, each may go out independently; but the second must not start until it knows that the first has escaped, nor must the third go until the second is safe; for, just as boats 1, 2, and 3 of each division are dependent, No. 2 upon No. 1, and No. 3 upon No. 2, so are squadrons 1, 2, and 3 of the whole force. It will not be of great importance to division No. 1 to know that division No. 2 is out; but it will be of the highest importance to division No. 2 to know that division No. 1 is in a position to do its share towards preparing the way for No. 2's attack.

If the outgoing boats be fired upon, they should not return the fire, or even hesitate in their attempt, so long as there remains the remotest possibility that they are not clearly seen and recognized. Experience shows that cruisers often fire at things which exist only in the imagination of some excitable man. I well recollect that in 1888, upon the occasion of the escape from Bantry Bay, there was a great deal of firing from the blockading force, and that we all believed that we had been observed. It appeared afterwards, however, that we had not been seen at all, and that the firing had been directed, either at an imaginary target or at some of our consorts which, though not trying to escape, were making a diversion in our favour. Nor need the outgoing boats necessarily lose heart if the search lights of their opponents be flashed right upon them. In 1888 a search light from the "Hotspur" was flashed along the whole length of the escaping "Severn," at a distance of not more than two or three cables (for we could distinctly see the people around the projector), yet by some chance the "Severn" was not discovered. But, of course, should there be no doubt that the attempt has been fully detected before a blow can be dealt, there should be a retreat. An axiom of torpedo-warfare is that, save perhaps where mere picket boats and launches are her opponents, the torpedo-boat must avoid being attacked and being provoked to fire until she is endeavouring to use her torpedoes. And another axiom is that she must not employ torpedoes as weapons of defence against casual foes, but must reserve them for employment as weapons of offence against the main enemy. Her proper defence is evasion and ultimately flight.

In addition to the position and formation of the enemy, the wind deserves the attentive consideration of the attacking Commander. Approach from leeward, especially when the wind is on the beam of the ships to be attacked, seems, upon the whole, to hold out the greatest promise of success; for the smoke of the ships' guns, when they open, while sufficient to obscure the boats from the ships, will not be sufficient to obscure the ships from the boats. If there be no wind, an attack is certainly best made from seaward, firstly, because that is the quarter which is regarded with least suspicion, and secondly, because the boat, having attacked and discharged her torpedoes, need not lose time and incur risk while turning under fire, but may run straight past the enemy back to port. But special circumstances must regulate the interpretation of all general rules. Where the coast is bold, and the depth of water has invited the enemy to cruise close in, it may be found wise to make the attack from under cover of the shadows of the land. In such shadows, both where there is no moon and when the moon is low down over the land, a torpedo-boat can only with the utmost difficulty be detected. It was by taking advantage of the land shadows that the boats of the Blue Squadron were able to approach the Red Squadron at anchor in Luce Bay on the morning of July 26, during the manœuvres of 1891. I was watching for them with an excellent night glass: but while in the shadow they were absolutely invisible, although they were less than half a mile away, and although the night was by no means a very dark one. I do not desire to advocate the making of the attack from any particular quarter, so much as to dwell upon the necessity for well organizing it beforehand, and upon the advisability of prefacing the real attack with one or two feints from a different direction.

On the eve of an attack, the boats to be employed should test all their torpedoes, both as to immersion, and as to the working of the machinery. The weapons should then be freshly charged, and finally everything should be formally and severely inspected by a responsible and specially qualified executive Officer, accompanied by an engineer assistant. The inspection should take cognizance of Officers, men, armament, engines, charts, instruments, &c., down to the smallest detail; and, the general plan of attack having been decided upon, all possible contingencies must be provided for. The main object to be attained is that at the specified hour for the commencement of the action, all boats shall be in their prearranged position, and that each Commander shall know what every other is going to do, and when he is going to do it, and also what he himself has to do, and at what moment. All is to tend to the due carrying out of successive single concerted feints and attacks, which have been prearranged and set down with the conciseness and accuracy of the entries in a railway time-bill.

The chief cautions to be observed, so far as experience causes them to occur to me, are, that boats should never expose themselves longer than is absolutely necessary, and should, as quickly as possible, withdraw out of sight, and then rapidly shift position, so as to

appear next time from a new quarter. Haste and excitement must be studiously repressed by the Officers, who should themselves discharge the torpedoes from distances never exceeding one cable. In returning to port after action, boats must throw off the rule of secrecy, and, in some unmistakable manner, announce their approach to their friends, signalling also whether or not they are pursued. If this precaution be not taken, the returning boats will certainly be fired upon. Sir George Tryon's well-known maxim is, "In war-time, if you see a torpedo-boat, fire at her without waiting to ask questions;" and, in offering this advice, the gallant Admiral is fully justified by all that has been seen of torpedo-boat work in the past. I think, however, that if returning boats made use of some very conspicuous rocket signal—each boat having her own for that particular night only—no risk would be run by not firing at her. On the other hand, if there be the slightest doubt about the craft, she must be attacked as she comes in. Wherever it may be feasible, I should advise that boats do not return to port until daylight, and, in the meantime, take refuge in some unwatched cove, or lie to where they are out of danger. It would, indeed, be a misfortune if boats, after having done good work outside, should come back to be sunk by their friends. But the risk is a very real one. Every recent series of manœuvres in England, France, and Germany has exemplified it.

Attacks against Fleets or Single Ships Cruising at Sea at a Distance.—In this kind of attack, the division boats may play an exceedingly important part. They can save their division from much useless wear and tear and exhaustion at sea, and can enable them to go fresh into action. The torpedo-boats themselves are, as has been said, not fit to attempt to keep the sea. If they do so, they do it at the expense of the nerve and physique of their Officers and men. But the division boats can keep the sea without danger of this kind, and it is therefore an unfair test of the capabilities of a torpedo flotilla to send it, as was done during the manœuvres of 1891, to worry and attack a sea-going fleet, and to deprive it of the co-operation of torpedo-gun-vessels. It is equivalent to sending a battleship fleet to sea without cruisers.

When one talks of torpedo attacks against ships at sea at a distance, one speaks, of course, relatively. No one dreams of attacking in this way a fleet in mid-Atlantic, or even 500 miles from shore. But a fleet operating, for example, in the Adriatic, in the English Channel, in the Irish Sea, among the West India Islands, or within, say, 300 miles of any coast-line, would be susceptible of attack by an enemy possessed of a shore base within range. That base need not be one prepared beforehand. Only a safe and unobtrusive haven for torpedo-boats is needed, and any retired little bay with a sufficiency of water, and not too difficult an entrance, will serve admirably.

From this base, having first seen her smaller consorts snugly anchored in it, the division boat issues. If there be two division boats, so much the better. They go forth alone, and, at 18 or 19 knots speed, they scour the seas in search of the enemy. Having found him, they follow him a little so as to discover, if possible, his intentions, and

then send or take back information to the base. If they be near a friendly coast, they telegraph the information from the next point, and order a rendezvous. If they cannot telegraph, one of them must go back with the news; but as the division boat would be able to cover about 150 miles in eight hours, and as a fleet, unless pressed, does not do much more than half the distance in the same period, the loss of time, though regrettable, is not particularly serious. Upon receiving the information, the torpedo-boats make the best of their way to the rendezvous. This brings them somewhere into the neighbourhood of the fleet. They pick up their division boats and follow the quarry, taking care, however, to keep well away from his cruisers by daylight. At night, an attack, arranged very much as in the case of an attack upon a blockading fleet, is made, the division boats covering their divisions as much as possible, and then standing by, either to attack meddlesome cruisers or to render help to their divisions in case of need. I do not think that they should approach ironclads unnecessarily, for they are comparatively large targets, and big shells bursting in them may easily be fatal; but I think that they may advantageously interfere to harass, and take off the attention of the enemy's scouts; and, if one of these should be a little rash or unwary, there may be an opportunity of torpedoing her.

Before every attack, a rendezvous for each division should, of course, be arranged. If there be more than one division, the two points of rendezvous should be well out of sight, but not too far distant, one from the other.

Once more a series of successive single concerted feints and attacks, directed according to plans as prearranged, seems to promise the best chance of success. I desire, however, to call attention to some of the relative advantages and disadvantages of attacks from ahead and attacks from astern upon a fleet under steam; since a consideration of these may influence a Divisional Commander in his choice of the quarter whence he will attack most seriously.

The economical steaming speed for most large ships is about 10 knots. This is the speed at which a squadron would be likely to cruise in war-time, unless it were engaged upon some pressing duty; and it is a speed which is roughly equal to 17 feet a second. The attacking speed of torpedo-boats ought to be at least 18 knots. This is a speed equal to over 30 feet a second. On a moderately dark night, a torpedo-boat approaching is not much exposed to detection by the look-outs in a battleship so long as she is at a greater distance than 2,000 yards. She may, of course, be prevented by cruisers and night craft from approaching even so near as that; but, for the purpose in hand, I will assume that she is not. The range at which, with reasonably favourable prospects, she may discharge her torpedoes at a moving mark in a sea-way, does not probably much exceed 150 yards. It becomes, therefore, in the highest degree important to her to traverse in as brief a period as possible what I may call the Helpless Zone—the zone I mean, in which, although she may be discovered and fired at, she cannot effectively attack in return. She will

naturally traverse it most quickly if she approach from ahead on the line of the enemy's course.

In the case of vessels having the speeds given above, viz., 17 feet per second for the ship and 30 feet per second for the torpedo-boat the times occupied by the latter in traversing the Helpless Zone of 1,850 yards (5,550 feet), are :—

If attacking from right astern	7 mins. 7 secs.
If attacking from right ahead	1 min. 58 secs.

Balance in favour of attack from ahead 5 mins. 9 secs.

Seeing that so long as she remains in the Helpless Zone, a torpedo-boat is liable to be struck and damaged, or sunk, without being able to do the work upon which she is employed, this reduction of the period of exposure deserves serious attention. What it means may be illustrated by a moment's consideration of the enormous number of projectiles which a modern vessel can launch at an opponent in the space of a single minute of time. Many a battleship of recent construction can bring to bear right ahead or right astern two heavy guns, six quick-firing guns, and six machine-guns, or revolving cannon. Leaving the heavy guns aside, the quick-firing guns could, in a minute, fire 8, and the machine-guns 200 projectiles apiece. This, from such a battleship as I have in my mind, would give a total of 1,248 projectiles of sorts per minute. Surely it cannot be a matter of indifference to the Commander of a torpedo-boat whether he run the gauntlet of about 2,470 projectiles or of about 8,750. Nor is this all. The slower the approach of the boat, the greater will be the accuracy of fire; and the more prolonged the exposure, the more will that accuracy of fire increase. In addition, and this is very important, a torpedo discharged from the boat coming down ahead will near the ship much more rapidly than one discharged from a boat following astern, and will afford proportionately less opportunity to the enemy to outmanœuvre it. But, although I would attract notice to this, I do not wish to be understood to imply that any torpedo ought to be discharged from right ahead or right astern. A torpedo discharged from right astern is liable to be deflected by the wash from the ship's screws, and has, moreover, but a small target; and a torpedo discharged from right ahead has not only a still smaller target, but has also to contend with the ship's bow-wave, which is very likely to deflect the weapon harmlessly astern. The proper position from which to discharge the torpedo from a boat coming from ahead seems to me to be broad-on the ship's bow; and, from one coming from astern, broad-on the ship's beam. In each case I would prefer to use broadside rather than bow tubes; for bow tubes, when boats are running at high speed, often act most unsatisfactorily. Many authorities advocate that an effort should be made to hit the enemy in the neighbourhood of his screws and rudder; but experience seems to show that if you can fairly explode your torpedo anywhere against his side you will do him all the damage that is necessary; and, undoubtedly, if you aim at him amidships you

are less likely to miss him than if you aim at his counter. If you succeed in disabling him in any way his next astern may complete our work by running him down in the confusion.

I have dwelt somewhat upon this question of the direction of the main attack, because, although it is quite obvious that, at least in some respects the attack from ahead is much less risky than the attack from astern, nearly all the attacks which I have seen made during manœuvres upon ships under way have, strange to say, been executed by boats coming up from astern. This attack will always, I suspect, be the favourite one in peace manœuvres, because, for various reasons, it is in peace-time the easier to attempt. It may also be the fact that vessels habitually keep a worse look-out astern than ahead. But I do not think that it will be the favourite mode in actual war; for it bids fair to be too costly in men and material, owing to the relatively long exposure in the Helpless Zone. The attack from ahead was not attempted at all during the British manœuvres of 1891. Two torpedoes only were aimed at ships under way, and both of these were discharged from boats approaching from astern; and all the threatened attacks came from the same quarter.

How to get safely out of action will be almost as difficult a problem as how to get safely in; but nothing more generally wise can be counselled than for the boat, which has already swerved a point or two in order to bring herself on to the bow or quarter of her opponent, to complete a turn of eight points if there be a second ship in the line, and to get away as fast as she can, showing her stern to the enemy's broadside, and so affording as small a mark as possible. If, before doing so, she can discharge a second torpedo, so much the better; but when withdrawing she must not lose sight of the probability that she will encounter a cruiser or be pursued by one; and, therefore, as soon as she is out of the zone of immediate danger she should sharply alter her course for the quarter which seems to promise her the greatest security. It may appear inhumane to say so; but I cannot convince myself that a torpedo-boat, having sunk her enemy, should stand by to assist the survivors. Her crew is obviously too small to resist an attempt made by numbers and desperation to seize her, and she has no accommodation for prisoners. When there is no second ship, the best course is for the torpedo-boat to maintain her original direction. Using the helm involves delay, no matter how handy the boat may be, and should, when practicable, be avoided. Not far away the boat should be able to rejoin her division, and with it she would be comparatively safe.

Attacks against Fleets or Single Ships at Anchor, Close at Hand or at a Distance.—I regard this as the least promising mode of attacking ironclads by means of torpedo-boats; for all modern ironclads have, or may have, torpedo-nets; and vessels properly commanded and possessed of nets would not fail to get them out immediately after anchoring in war-time. It is true that Captain A. K. Wilson, U.C., U.S.N., has invented a species of shears which, fitted to the head of a torpedo, will enable it, provided all goes favourably, to cut through

some existing nets; but it is equally true that the invention, though ingenious, has only a limited practical value, because nets strong enough to defeat it could be easily carried, even if it were all that is intended to be. But certain vessels do not, and are not likely to carry nets; and these, especially if they can be thoroughly surprised, may be attacked at anchor with good results. It may also be sometimes worth while to descend upon battleships immediately after they have anchored, in reasonable expectation of finding that they have not had time to get their nets out. As a rule, however, battleships will in war-time get their nets out and in very quickly. I hear of ships in the Mediterranean which, when first commissioned could not execute either manœuvre in less than three hours, but which can now do either in ten minutes. Commanders should therefore, turn their attention to inducing hostile men-of-war to anchor with nets out to take their nets in and, if possible, to making them also get under way. This they may sometimes do,—particularly when the vessels are lying elsewhere than under forts,—by obtaining the temporary co-operation of battleships of their own class. Ships in unfortified havens will remain doggedly anchored when threatened by torpedo-boats, but not when threatened by craft of their own class; and when, in deference to a feint by battleships they weigh, the torpedo-boats may dash in and find their opportunity. When an attack is made, the same considerations should guide it as should guide other attacks. Surprise, efficiency of men, machinery and weapons, and concerted action are all-important factors in the success of the undertaking; and if the attack can be delivered from the most unexpected quarter,—which in this case is the direction of the shore,—it will have the best chance of doing well.

It is claimed for some of the most modern marks of the Whitehead torpedo that, if they hit a net fairly and squarely when running at full speed, they will penetrate it. This may be so. If they explode in contact with it, they will certainly demolish great part of it, no matter how it may be boomed out; and therefore it may occasionally be worth while to organize a torpedo attack with a view to first destroying the nets and then the ships; but this seems to me to be a risky and precarious device, and one which should not be attempted where there is a possibility that other methods may, within a reasonable time, become practicable.

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So much for those forms of attack which seem to be permissible.

The attacks which, in my humble view, are not permissible are attacks by daylight, and attacks during actions wherein two fleets are engaged. Concerning the almost absolute hopelessness of success by daylight against any respectable enemy I need, I think say nothing. But it is necessary to say a word concerning attack during actions wherein two fleets are engaged: firstly, because French tacticians notoriously believe them to be practicable, and secondly, because at least one very distinguished British naval Officer may be suspected of holding the same opinion.

The tactical unit of the French Fleet consists to-day of a division commanded by a Rear-Admiral, and consisting of three ironclads, three cruisers, and three torpedo-boats. This unit was adopted a few years ago, and was deliberately readopted for the manœuvres of 1891. And in his recently published book on "The Development of Navies," Captain S. M. Eardley-Wilmot, R.N., criticizing the battle of Lissa, says:—

"One thing is wanting to complete the valuable experience gained on that day and make it applicable to the present time. No locomotive torpedoes were used, this arm as a naval weapon not having been then introduced. Whether, after the line was broken and the ships were all mixed up together, it would not have been as dangerous to friend as to foe may well be questioned; but small vessels specially armed in this way would have had good opportunities of gliding in under cover of the smoke and dealing deadly blows to partially disabled ships."

The objections to the use of torpedo-boats in fleet actions are twofold. If they be used in fleet actions, they must, of course, accompany any fleets to sea, and, whenever they have hitherto done so, the inconvenience of the plan has been abundantly apparent. They cannot in bad weather keep up with 10-knot battleships: they are perpetually in distress, and their crews get worn out and incapable of energetic action. Lieutenant Charles C. Rogers, U.S. Navy, in his summary of, and comments on, the naval manœuvres of 1890 ("General Information Series," No. X, Office of Naval Intelligence), says of the French operations: "The battleships and cruisers behaved well at sea, but the torpedo and dispatch vessels were a source of anxiety. Several times the battleships were obliged to take some of them in tow; the manœuvres seem to prove that they have not sufficient endurance. Their very powerful and complicated engines are in small and light hulls; and in continued bad weather, which occurred during the later manœuvres, the personnel gave out constantly." And in his report on the French Manœuvres of 1891 ("Marine Rundschau," November, 1891), Kapitän-Lieutenant von Klein, of the German Navy, remarks of the torpedo-boats: "These, which, with their superiority of speed, were intended to attack the enemy during the night, experienced trouble and discomfort in keeping up with the squadron at 10 knots. Those of A squadron, the ships of which steamed at 12 knots, were absolutely unable to preserve station, and had to be sent away to await better weather." This observant officer, in summarizing the lessons of the operations, suggests that they indicate that the proper functions of torpedo-boats are not understood in France, and that such craft should be entirely restricted to service as part of the mobile coast defences. With this last suggestion I do not, however, believe that British Officers will entirely agree.

The other great objection to the employment of torpedo-boats in fleet actions has been hinted at by Captain Eardley-Wilmot, and is, I am sure, a very real one. The boats would be as dangerous to friend as to foe. At Plymouth, during our manœuvres of 1890, No. 86's

torpedo, intended for the "Black Prince," apparently hit the "Anson," and No. 59's torpedo, intended for the "Northumberland," hit No. 51 while in 1891, No. 42's torpedo, aimed at the "Hotspur," struck the nets of the "Northampton." In both these British manœuvres also quite a number of torpedoes, that had missed their mark, were wandering about after almost every attack. The same thing happened at the attack on the "Blanco Encalada"; and it is probable that something similar will happen in the case of every attack. What, then, would happen to two fleets of ironclads mixed up in action with two flotillas of torpedo-boats? The answer seems to me to be tolerably obvious.

But there is a mission for small torpedo-boats accompanying large ships to sea, and acting from them as from a mobile base. The torpedo-depôt ship "Vulcan"—a comparative failure, I admit, yet the representative of a type which may easily be improved—carries six of Yarrow's 60-foot 16-knot boats; and these, dropped into comparatively smooth sea, within a reasonable distance of a hostile squadron, might, in certain circumstances, do very useful work. A land base is, however, always much superior to a floating one. It admits of larger and faster boats being employed; it gives the boat far better shelter; it involves much less wear and tear of material; and, in brief, it is above comparison with the other, which is, at best, a *pis-aller*. A "Vulcan," caught in daylight by a couple of fast ironclads, with her flotilla waiting around her to be hoisted inboard, would not be in an enviable position. A good land base, containing an equal number of torpedo-boats, would be vastly safer, and could be easily rendered so strong as to be perfectly secure, unless forces were landed to co-operate against it.

The French and Italian Governments have adopted the principle of establishing "nests," or small military harbours, for torpedo-boats around their coasts. This seems to be an unwise proceeding. A "nest," the existence of which is perfectly well known, can be guarded against, and easily attacked. An impromptu "nest," on the other hand, can be quickly created, almost anywhere, on a deeply indented coast; may be quite as serviceable as a permanent one; and may, for a considerable period, exist in war-time unknown to the enemy. A permanent "nest," moreover, must be in some way protected by expensive works or by mines, while an impromptu "nest" may be, for a time at least, protected by the secrecy with which it has been formed. Stores and provisions for torpedo-boats can quickly and easily be sent to any point of a civilized country by rail, and it is almost as convenient for the boats to take them on board at one place as at another. Therefore, I would strongly advocate impromptu, as opposed to permanent, torpedo-boat stations in war-time. The former conduce to mobility; the latter really tend to restrict it; and it is the mobility, within, say, a distance of 200 miles of your coast-line, of your torpedo-flotilla that, more than anything else, measures its utility. With a sufficient, efficient and completely mobile torpedo-flotilla on its coast-line, a country should be able for a long time to keep any maritime enemy at a ver

respectful distance, and to strike anything venturing within 200 miles. Permanent stations are well enough in peace-time; in war-time the first step should be to abandon them in favour of impromptu ones.

It has often been debated whether or not the search light should be employed by torpedo-boats in the attack. My experience indicates that generally it should not. Silence, darkness, secrecy: all these are, as a rule, favourable to the boats, and they cannot be, as a rule, too carefully observed. But when an approaching torpedo-boat, which has been seen and fired at, discovers that the enemy has got her range and is doing her damage, she may, I am convinced, often save herself by boldly flashing her light full in the eyes of the gunners. I saw a case in 1891 in which, after the light had been so used, the range of the boat seemed to be entirely lost. The use of search lights, and especially of search lights against search lights, is a subject which has not yet been sufficiently studied. As at present advised, I would prefer to dispense with it on ordinary occasions of defence, as well as of attack. It exercises a prejudicial and very varying effect upon the eyesight at the time as well as subsequently; and, while it may make valuable revelations, it may also make dangerous betrayals. But the subject is too wide a one to be here entered upon.

For the numerous failures of torpedoes to hit their target, and even to run at all, I think the human element is more to blame than the mechanical. Familiarity with the weapons on the part of those who have to use them will, as training improves, reduce these failures to a minimum; and the weapons themselves have now reached so great a degree of perfection that they leave very little to be desired. I do not mean that it is impossible to conceive a better automobile torpedo than the latest mark of Whitehead; but I do mean that the Whitehead seems to have very nearly exhausted such improvements as can be made in it, and that at present, although it has some inherent and inevitable defects, it is, upon the whole, better than any other torpedo.

Captain S. M. EARDLEY-WILMOT, R.N.: I have observed that whenever a paper is read in this Institution, especially if it is a paper on a naval subject, there is always great reluctance on the part of those who know most about the subject to rise and start the discussion. As I cannot claim myself to know very much about it, I shall plunge fearlessly into the fray in the hope that some who do know or have had very much more practical experience in the handling of torpedo-boats will follow, to give us their valuable experience. The author prefaced his paper with some remarks with regard to an explanation of his meaning and qualification to deal with the subject. If anything in the nature of an apology were needed, and I do not myself think such a thing was required, I think he has thoroughly proved his capability of dealing with the subject, and has given us a paper full of most interesting matter, and it seems to me that a paper of this sort has been very much needed for a considerable period of time. Various opinions have existed as to the place and use of torpedo-boats in war, and as Mr. Laird Clowes justly remarked in his paper, views have changed. Regarded originally solely as weapons of defence, torpedo-boats are now looked upon as weapons of offence, striking sudden and unexpected blows from distant bases. I should like first of all to point out the great value of the torpedo-boat as a defensive weapon. A torpedo-boat, carrying a very powerful torpedo, may be viewed from the point of view of the defence as a submarine mine with power of locomotion. The great point about a submarine mine is that, once fixed, it is immovable, but a torpedo-boat

can shift its position from one point to another ; and in some harbours of dual entrance it is a great thing that you can move your torpedo-boat from one entrance to another, whichever may be threatened. A submarine mine has not this faculty, and the result is you require an enormous number of submarine mines. Very much the same argument is applicable to forts and ships. A ship is a fort with the power of shifting its place when required. Then, again, a torpedo-boat may be viewed as a controlled torpedo, such as we have seen in the type of the Sims-Edison and the Brennan, and with a much greater radius of action. Therefore, we should not altogether neglect its great capabilities as a defensive weapon. We have had some very interesting information as to the power of the torpedo-boat to effect its attacks upon squadrons in various ports in distant places. We must, however, I think, recollect that in our manœuvres the torpedo-boats have a great advantage which they would not have in war ; that is to say, they start to make their attack under conditions, knowing the position and composition and general equipment of the squadron which they are to attack, which I do not think they would have in time of war. That is a very important point, that in these manœuvres the torpedo-boat flotilla, ably conducted as it was, had the advantage of knowing that the enemy's squadron was at anchor in a certain port, that it was composed of a certain number of ships, and that if the torpedo-boats started at a certain time and kept up a certain speed, they would arrive at the place where the squadron was, before daylight. That seems to me a very important point, and therefore when we are called upon to discuss the best conditions in which to attack a ship, whether we should attack her from ahead or astern, and so forth, I say the position from which you will attack will entirely depend upon the position of the ship, because you may find, when you come to the position in which she is, that you may not be able to attack from any position you like. Of course, no Officer would attack the bow or the stern of a ship—a limited target of 60 feet—if he could get a shot at the beam, which is a target about eight times as long. That would entirely depend upon where the torpedo-boats might find the squadron when they arrived at the place where they expected to see it. The same thing applies as regards the effect of torpedo-boats upon a blockading squadron. The author has put forward a very excellent idea, that a torpedo-boat may be transported across the country, launched at some distant place, and then proceed to attack a blockading squadron from the rear. Now, it has been assumed, I think rather hastily, that the action of a blockading squadron is almost entirely nullified, if not made very much more difficult, by the action of torpedo-boats ; but I cannot myself say that that would be the case. The blockading squadron is not obliged to lie close into the blockaded port ; in the old days it was seldom that the main bulk of the squadron lay close in ; it used to be 20 or 30 miles off, with its inlying craft at a much closer distance. In the same way, at the present time, we shall place the main bulk of the blockading squadron 20 or 30 miles off, with small craft lying inside ready to grapple with the torpedo-boats when they come out. Consequently, supposing the torpedo-boats did manage to get through, they would find the blockading squadron, which would not be in sight, might be in any part of the distant seas, and if the blockading squadron changed its position every night, giving notice of that to its satellites, the torpedo-boats that had got through the inshore squadron would have to find the outer squadron, and might spend pretty nearly the whole of the night before they did so. Therefore, I do not see that the work of the blockading squadron is made impossible by the existence of torpedo-boats. Then I notice the author of the paper made a remark about nets in which he said they only had a very limited value, because, although torpedoes at the present time had special apparatus for cutting through nets, it was very easy to make the nets heavier and stronger so as to keep out the torpedoes. It is the old story of guns *versus* armour. It is very much easier to make the torpedoes heavier and swifter, and so to overcome that, than it is to go on increasing the weight of the net. Consequently, I look for the time when we shall practically almost have to give up that. I think the torpedo, like the gun, will beat the net. The writer of the paper was kind enough to allude to some remarks I made in my book upon the "Development of Navies," in reference to the action at Lissa, and he inferred from those remarks that I was speaking about what might have been

the action of torpedo-boats supposing they had existed at that time. But, as a matter of fact, what I had in my mind was not torpedo-boats, but those torpedo-gun-boats such as the "Rattlesnake," and I think when the vessels of the two squadrons have got to close quarters, such vessels of 600 or 700 tons might, under the cover of the smoke, glide in and deal very severe blows without extraordinary risk to themselves. It was not a question of torpedo-boats. I quite agree with the lecturer when he says that a torpedo-boat should not be looked upon as a portion of a sea-going fleet, although I think there is a tendency rather to make too much about the hardships and impossibilities of existence on torpedo-boats, because last year when the French squadron arrived at Portsmouth Harbour they had two torpedo-boats accompanying them, which the Admiral stated had been with him for six months, and had been served all through the cruise by the same Officers and men, and that he found, after the first month or two, they had gradually accustomed themselves to the life, and what they can do, no doubt we shall do. No doubt, in first going on board, as, in fact, going to sea, there is sickness and discomfort, but, after a time, you become inured to it the same as to anything else, and, if it was necessary, no doubt we could do it. But the great difficulty about torpedo-boats accompanying a squadron is that they cannot keep the same speed, as it was said a short time ago by the Director of Naval Construction, in an interesting paper, that the larger the ship so much easier is maintenance of speed. Therefore, we have always endeavoured to get something larger than torpedo-boats as sea-going vessels. We have our examples in the "Rattlesnake" and her consorts. I think the lecturer is very right and forcible in what he says with regard to the matter of organization, that you cannot use torpedo-boats effectively unless they are organized, and frequently practised throughout the year. We should always have a flotilla of torpedo-boats in commission, not only for exercise in their own particular work, but also as training ships, and admirable training ships, both for Officers and men. That is carried out to a much greater extent in foreign navies than in our own. In the Baltic it is something wonderful to see the amount of training and exercise that is carried on during the year in torpedo-boats. I rather take exception to what the lecturer said when he stated that nobody except smokers and engineers could go on board torpedo-boats, and navigate and operate in them. I think only those who have had considerable experience in torpedo-boats—

Mr. LAIRD CLOWES: You misapprehend me there. I meant that there is no necessity for them to be in that particular boat, but there is for the engineers to be kept in their particular boat, on account of the difference in the engines.

Captain EARDLEY-WILMOT: I beg your pardon. That, I think, is a very great point. I do think we want more organization in our torpedo-boats. Of course when you hear people comparing the number of torpedo-boats of one country with another there is no reason at all in that. One country may want 6 and another 600. It is entirely a matter of the extent of coast, the number of harbours and ports that have to be protected. I will not detain you any longer, because, no doubt, you are anxious to hear those who have had more experience than I have. At the same time I must say I think we have had a most interesting lecture, bristling with points for discussion, so that it is very difficult to know what to pick out and what to leave alone.

Admiral LONG: As Mr. Laird Clowes has alluded to a little joke which I addressed to him on a former occasion, I feel bound to endeavour to make some remarks on the paper. "The place and uses of torpedo-boats in war" is a very suggestive title, and as regards the place, I think one may say that in proportion as the hostile coasts are contiguous, or as trade routes approach hostile coasts, so the torpedo-boats become more important. There is one point that has not yet been alluded to, that is, the time a boat must take to return to the position from which it is expected to act. If we take a night of fourteen hours' duration, and credit the boats with a speed of 20 knots, that is 280 miles. If the boat is to go out and come back again without being captured in the face of a Navy possessing preponderance at sea, it must not go more than 140 miles, so that, roughly speaking, I think we may say the place of torpedo-boats in war will be where the coasts are not removed from each other or from hostile trade routes more than 140 miles.

Of course the other point, about 2nd class torpedo-boats acting from a *depôt* ship is a very important one, and a very good one, but that mode of attack would probably be more open to use by the Power possessing the supremacy of the sea than it would by any other Power. What is most interesting to England is probably the sphere of action of torpedo-boats as against her. There is another important point as to the place in which torpedo-boats would come in. Certainly in the places where the water is generally smooth, for when the water becomes rough the torpedo-boat is at a great disadvantage; her movements are much more conspicuous, and her speed is diminished, so that that zone which Mr. Laird Clowes has so well described as the "helpless zone" is very largely increased. As regards the time when the torpedo-boat would be of use, I think we are most of us agreed that the night is the time when it will find its sphere of action. In the day-time, we agree with Mr. Laird Clowes that the torpedo-boats, unless they are in very great numbers, are not likely to exercise any decided effect. Of course, like the charge of Balaclava, it is possible to imagine a great number of torpedo-boats incurring most frightful risks, and a great many of them being destroyed, and yet a few of them coming home. That would always be a thing the possibility of which ought to be kept in mind. I think the point which Mr. Laird Clowes puts, that torpedo-boats are now generally considered as only suitable to act from shore bases is in the main undoubtedly correct, and what would be called the proper function of torpedo-boats. With regard to the uses of torpedo-boats in war, their particular use no doubt will be from ports which are subject to blockade; but although I do not think they will prevent blockade, I do think they will render it far more difficult than formerly to reconnoitre a port and to ascertain what ships are there. They will come in very formidably there. No doubt they will also come in as a most formidable offensive weapon, as Captain Eardley-Wilmot put it. They will be launched like hornets direct at the enemy, and no doubt successive groups of them will be going about in all directions. Though Mr. Laird Clowes has not said anything in his paper as to the expediency of building torpedo-boats or the policy that should be pursued, I think on general grounds it must be said as a matter of common sense that a nation which aspires to the supremacy of the sea must take care to be supreme in all the weapons which will be used at sea. Otherwise I think that nation which neglects any particular weapon on the ground that that is not the weapon they are going to use, but something else, as we have no experience of actual warfare, may possibly find themselves mistaken. It is no right to risk anything on such an argument as that. I agree generally with the lecturer in his tactics about attacking from ahead. As mentioned, in the *manœuvres* last year no attack took place from ahead. I have had a conversation with the Officer of the attacking squadron, and he said, as he was not allowed to torpedo the scout leading the battle-ships, he attacked the sternmost battle-ship. In real war he would first torpedo the scout and then the battle-ship. I mention this to show the view taken by the Officer himself. I think there is no doubt that a ship that leaves a port at a salient point will be less easy of attack by torpedo-boats than one quitting a port situated in a re-entering angle towards the land, such as Liverpool. Torpedo-boats would have greater advantages in the latter case. They would know the course that the ship would take, and if there were a number of torpedo-boats, it is highly probable they would destroy her. There is one point that Mr. Laird Clowes has not alluded to, which is the very great difficulty which must exist in identifying ships at night. It seems it will be hardly possible for torpedo-boats in an open channel, open to vessels of all nations, to avoid making mistakes on a point of that kind, and I think in one of the lectures to be discussed next week a remark is made as to whether torpedo-boats are to torpedo merchant vessels. We should not lose sight of this problem, for it seems to me that it will be one of the great difficulties with torpedo-boats in war. It is a difficulty that does not occur in *manœuvres* at all, but in war undoubtedly it will be one of the great difficulties. A torpedo-boat making its presence known becomes liable to be destroyed, and if a torpedo-boat does not do so, it incurs a very serious risk of torpedoing a neutral or friendly ship. I do not think there is anything else I can say with advantage, especially as I know there are Officers here very much more competent to deal with this subject. I am very much obliged to Mr. Laird Clowes for his valuable paper.

Vice-Admiral Sir NOWELL SALMON, U.C., K.C.B.: On the subject of the lecture in general I will not venture to remark. I look upon it that Mr. Laird Clowes has laid down a number of postulates which we are none of us prepared to controvert in any way. He has, however, barely touched upon the point of the use of electric lights as against torpedo-boats. I may claim to have had some little experience of it, both in attack and defence. I have tried it under different circumstances, and have endeavoured to make up my mind whether we should use the electric light or not, and am inclined to think I would rather not have it at all. On any occasion that I have seen, whether it has been at a fixed station on shore or whether it has been a fixed station on board, making a quadrangle within which ships may lie, the torpedo station has always been the point of attack and has always suffered. In one case in which I put a squadron inside four ships to make a path of light round them, the ships showing the light were, of course, at once the point of attack and were all attacked and sunk. One Commander, I think, said he was sunk no less than seven times. The torpedo stations on shore were the objects of attack, and very brilliant attacks, too, which showed the powers of endurance of the seamen, powers which I was very proud of at the time. I think, taking it altogether, in all the cases I have seen, I would rather be without the light. I can remember a little incident in which I took part. It shows how very curiously the electric light may act in some cases. The squadron inside the rectangle of light was in total darkness, and my boat, in which I was inspecting the preparations, happened to get within the beam of one of the ships showing the light. Just as this happened I saw a boat inshore of me. I thought she was one of the attacking boats steaming up inshore. Of course I set to work to cut her off, as I was commanding the defending squadron. I steamed as hard as ever I could. I got my muskets ready, and so on. Still she went past me, going inshore as I thought, and it was not until I recognized my own shadow shaking its fist at the engineer for not clapping on more steam that I found I was chasing the shadow of my own boat thrown on the cliff. In a very few seconds I should have been hard and fast ashore. I should like to hear other opinions with regard to the electric light, because I think it is a very important matter in connection with torpedo warfare.

Lieutenant F. C. D. STURDEE, R.N.: I have been referred to by the lecturer as having received a verbal invitation to deliver a lecture in this Institution upon torpedo-boats. I very much regret not being in a position to do so. The first point that struck me in reading Mr. Laird Clowes' lecture was his want of faith in the torpedo, on which the whole value of the torpedo-boat depends, as all through he infers that the weapon is unreliable, and that there is a strong probability of mistakes being made in using it. The next point is that he appeared to reduce to a minimum the amount of dash which is required from torpedo-boat Officers. Now, as far as I can see, in order to make a successful attack these Officers must be encouraged to risk everything when they have once made up their minds to deliver the attack. When attacking they must not think about their own life or about what may happen to the boat, but simply try to do the best they can without thinking how to retreat afterwards. I feel sure torpedo-boat Officers will attack in this spirit. The paper seems to convey the idea that you can arrange all your details beforehand, just as if you were making out "a railway time bill." Now, from my experience, I am persuaded that that cannot be done. But I would like first to confine my remarks to the weapon; we know that the Whitehead torpedo has only been in existence for the last twenty-five years. When it was invented in 1867 it was a comparatively insignificant weapon, having a speed of 6 knots for a short distance. In 1882 it possessed a speed of 20 knots for a 600 yards range, and now in 1892 it has a speed of 32 knots for 600 yards or 31 knots for 800 yards. The weapon may now be considered thoroughly reliable; every weak part has been thoroughly considered, and every possible improvement introduced, so as to render the weapon as perfect as possible. I have not the slightest doubt that very shortly the weapon will be still further improved, and a speed of 40 knots obtained, which, no doubt, Mr. Brotherhood, who, I observe, is here to-day, will be able to assist in obtaining, and that it will become a still more perfect and destructive weapon. Mr. Laird Clowes seems to think that it has already very nearly reached the final point of perfection and that very little is left to be desired. Besides its

increase of speed and reliability, the modern torpedo, if it comes to the surface during its run, is very seldom deflected out of its path; this was not the case with the older patterns, which, if they once came up, were liable to curve either way. This is a very important point with regard to what I am given to understand is one of the uses of the torpedo-gunboat class, viz., to catch and sink torpedo-boats; but to enable them to do this they must put themselves in a position from which the boat could easily sink them with one of their torpedoes, as they form a considerable torpedo target on account of their deep draught and length, so that a torpedo adjusted to run near the surface stands a very good chance of being effective. With the improvements introduced, there has been a considerable reduction in the number of failures. Of course there must be a certain percentage of failures with the most perfect torpedo. I am sure, if, when using any engine, you were to start it at full speed and leave no one to attend it, there would be a certain number of accidents. We must, therefore, recognize the probability of some failures; but the result is, on the whole, very good, when you consider in a Navy like ours there are about 13,000 torpedoes fired every year, and out of this large number very few are lost. Of course the fact of our having to recover torpedoes in peace is a great nuisance, as if a torpedo goes to the bottom it is a great inconvenience, perhaps, to the movements of a fleet, and this is one of the causes which probably prevent torpedoes rising in the estimation of Officers. If, after gun practice (supposing such a thing was possible), the shots had to be recovered, I hardly think the gun would be held in such high estimation, and that, probably, partly accounts for the feeling that sometimes exists against torpedoes. There is another point about the increase in the size of the target, and which is a very important one. Thus, if you look at the "Royal Sovereign" in Portsmouth Harbour you will see what an enormous target she offers to a torpedo. There is a ship drawing nearly 30 feet, and 360 feet long. Then there is another important question as to the value of nets. Captain Eardley-Wilmot said it was a repetition of the question of guns *versus* armour. But nets at the present, without considering net cutters, I suppose, are comparatively inefficient, because the torpedo can easily run under them. The fact that there is a want of realizing the rapid improvements which have been made in the torpedo by a large number of Officers, tends to keep down the number of torpedo-boats, and, according to "Nauticus's" letters in the "Indépendance Belge," we have only 13·9 per cent. of the total number of torpedo-boats possessed by the maritime Powers, whereas we should have 40 per cent. There is no doubt that the question as to the use of torpedoes in a fleet action has not yet been fully considered. I imagine that they will come very much to the front, and cannot help feeling very strongly upon the point because of the tremendous danger in these days of treating a weapon with contempt, or not giving it its proper value. Mr. Laird Clowes has mentioned my name with reference to the Plymouth attack in 1890. He complains that in this case, neither the organization nor the training was what it should have been. Now, as far as I have heard of the Plymouth attack was supposed to have been successful. There were nine torpedoes fired and six of them hit. I think these results may be considered fairly satisfactory, and taking the results of the different manœuvres, I find the percentage of hits is two out of every three torpedoes fired. To get these results shows the training was not bad, and as to the organization, every Officer knew the general idea of the attack, and every preparation was made before leaving Guernsey; there was no difficulty about keeping the boats together, as it was a clear night. There were six boats, and I think a division of six boats was not too many for the work that it had to accomplish. With six boats we could sink six ships. If there had been three boats, only three ships could have been sunk. The boats kept in close order up to the breakwater, and they were all well in hand, having been practised at station keeping beforehand. It was only a case of following the leader. There is another statement about the "flurry" in firing. Now, to this particular case of an attack, as we approached the breakwater, we were certain that we could get in; there might have been a boom across the entrance or guard-boats; you never can tell what is going to happen. Everything was ready to discharge the torpedoes immediately the boats were discovered, they went at full speed and tried to fire their torpedoes as soon as possible. There

course haste, but not necessarily "flurry." About the large number of failures to run during the British Manœuvres of 1891, I do not think that is quite correct; there were three failures to hit out of nine, but some others were disputed. Unfortunately the ships had nets out. It would be a good thing in manœuvres if the nets were kept triced up, because it always leads to discussion afterwards as to whether the torpedo actually hit, and there can be no doubt if the head is damaged. The lecturer rather leads one to think that he has little familiarity with torpedoes, when he speaks of them having been fired "before they had been tested for floatability, and even before they have been charged with air." Testing for floatability is not at all necessary for action. The torpedoes were charged with air, but they had a leaky valve, a defect which has been obviated in more recent torpedoes. Then there is a point he mentions about the unreliability of torpedoes and their being a danger to friends as well as foes. I quite grant that any neutral ships anchored amongst a fleet in the Sound, for instance, would have a bad time. I should be very sorry to be in a neutral ship in harbour when a general torpedo attack is being made, because they must run considerable risk of being hit by a torpedo; there would not be time to distinguish the neutral ships from others. This would probably be equally true in a bombardment. The point which he states of one torpedo-boat being hit by another is not quite correct. The fact is, that No. 59's torpedo which missed the "Northumberland" went on to the breakwater. The torpedo that actually hit No. 51 was a torpedo that had already sunk the "Inconstant" and would have blown her up, and thus would have been expended and could not have hit the boat; but, as it was a dummy attack, the torpedo, after striking, ran under the bottom of the "Inconstant" and struck the boat on her other side. As to the torpedoes floating about after being fired, I remember seeing this in the newspapers, as if they had not run, or had of necessity missed the ship. That was not so; they were the torpedoes that had done their work, and were waiting to be picked up. On the question of organization, which is a very important point, and which has been referred to by previous speakers, the lecturer rather inferred that anyone can command a torpedo-boat. Now, I think it is a very important thing that young men should be always selected to command them, and therefore I would venture to suggest that all the comparatively short torpedo course which acting Sub-Lieutenants have on board the "Vernon" should be devoted to the Whitehead torpedo and handling of torpedo-boats, so as to better qualify them for command of these boats as either junior Lieutenants or Sub-Lieutenants. There is a very important point about mobilization. So far as I read, everyone is agreed that the torpedo-boat is to strike suddenly at most unexpected points; therefore on the first night of a war with any neighbouring Power, it is of the most vital importance that the boats should be ready to attack the ships in the enemy's harbour. To ensure success, this points to the increased importance of qualified Officers and men being available to man the boats without any preliminary practice. Are we in this position? And is the defence of our harbours and roadsteads where our ships are likely to assemble such that they will be safe from an attack from the enemy's boats on the first night of the war? There is a reference made to the Chilian War and to the torpedo-gunboats being driven off by the "Aconcagua." I pointed out in the discussion on Admiral Long's lecture on quick-firing guns that that was not the case. Torpedo-boats have principally been considered as attacking boats. When dealing with them in the matter of defence, there is another very important point that has not been brought out in the discussion, and that is, as to the deterring effect they would offer to an invasion. I fancy that soldiers would not be very anxious to embark in transports if they knew that they were liable to be sunk by torpedoes. It would be next to impossible to effectually defend a fleet of transports from a torpedo attack. I am of opinion in certain cases the boats would be most valuable attached to fleets as auxiliary power, but not in any way to hamper their action, the boats being shovoyed by a cruiser in case the weather gets so bad that they have to go into harbour. In this way in fine weather, in confined waters like the Mediterranean or the English Channel, an Admiral might be able to derive assistance from them. I am sure to establish an efficient blockade they will be indispensable, except in certain exposed places, but a small harbour will have to be occupied for the boats to

go into in the day-time to rest the crews, &c. They were of the greatest assistance in the Greek blockade in 1886, where only the small types of boats were used, but the weather was fine. At Bantry Bay in 1888, the forcing of the blockade would not have been known, but for the boats, and one of them torpedoed the flagship; the question of hitting is, however, disputed. Any fleet forcing a blockade will bring their torpedo-boats out with them, and will thus have an advantage over the blockading fleet if they have none; besides, these boats would have been continually harassing the blockading fleet. The lecturer lays great stress on the advantages of divisional boats. Personally, I do not see any use in them. It is a great nuisance for the leading boat to draw more water than the other ones following, as it is of the greatest advantage for the boats to be able to go over shoals; and to do this, they must draw very little water. I see by the Naval Estimates we are going to build ten new boats, and I do trust that they will be slightly larger boats than No. 82 type, as more boiler power is wanted to maintain the speed of the present craft, and that brings me to another point, namely, that it is a great mistake to organize boats of unequal power in the same flotilla. If the boats have the same turning power and the same speed, there is nothing like the same danger of collision. Captain Eardley-Wilmot pointed out one of the differences between the last manœuvres and actual war was that in the former case you know exactly where the ships are. This was not quite the case, as the boats had to do all the scouting, because there were no more suitable vessels to do it for them, and therefore they were under considerable disadvantages, besides which Admiral Long could steam up and down our coast and bombard our harbours with impunity and we could do nothing, not even having the moral force of any ships to prevent this happening, so that the proper value of torpedo-boat stations was not sufficiently tested. With the growing importance of torpedoes it is necessary that all cruisers should carry a steamboat of such a size that torpedoes can be fired from it. This is of the highest importance, as these ships will principally compose our squadrons on distant stations, where there may be no 1st class torpedo-boats at hand.

Lieutenant BACON: I do not think there is very much left that I can say following Lieutenant Sturdee, but there are one or two points on which I may say a word. The first is as to the remarks on the errors made by Officers in charge in the attack in 1891 manœuvres. Nearly all errors made by Officers in charge of boats are due to want of practice. You have young Officers, and if you want them to be of much use, you do not want them to be too cautious. If you have young Officers, you must train them. The training that young Officers at present get before going into boats is very small indeed. They require some considerable previous training to give them a thorough knowledge of torpedoes so that they may *really* be thoroughly efficient when they go into the boats. Mr. Laird Clowes says among other charges which have been touched on by Lieutenant Sturdee that he has been informed that many Lieutenants in command of boats have been in boats without proper instruments for navigation. Now navigating instruments are not much required in a torpedo-boat. A pair of parallel rulers, a pencil, and a half-crown clock will take you through most things. You do not want any refinement, as your cruises are comparatively short. The sextant is not much good if you have not got a chronometer. If you have not a chronometer, you cannot find the longitude, and therefore sights are but little good in the Channel where the courses are most often east and west; but if you know the course you are running and the speed, you have your charts, and you can do all the coast navigation required. When also you come to think that nearly all your navigation will have to be done at night, without showing a light, without being able to look at a chart and without, perhaps, being able to look at your compass except for a second or so, then, I think, you will all own that Officers will have to be sent into torpedo boats to be thoroughly trained, and not, as suggested by Mr. Laird Clowes, that the boats when commissioned should be simply left in charge of warrant officers. You must thoroughly train your Officers in the use of both the boats and torpedoes if you want them to be thoroughly efficient and have confidence in themselves and the weapons they use. A half-trained Officer is always thinking at the critical moment, when he wants his full attention and nerve, What have I forgotten? You can never thoroughly appreciate how much you have to learn to command

torpedo-boat until you are actually standing on the deck of such a boat going into a harbour where ships are at anchor, and you practise yourself determining how you would attack them. That is a question that is never forced upon you thoroughly until you are in charge of a boat. It is the same thing when you meet a ship at sea. You come across a steamer, make a dummy attack, and perhaps suddenly think, What would I do if she suddenly put her helm hard-a-port? You must be on the boat, and you must have had the experience, in order to thoroughly impress the whole thing in your mind. If you want Officers to have confidence in their boats, they must have practice. Another point in the lecture I cannot agree with is that all through it, to my mind, there seems an underlying vein of caution. All the attacks are arranged with a view of saving the torpedo-boat: you are not to go on if you get fired at; retreat in one case is advised when fired at. Now the very last thing that I think we should teach Officers in command of torpedo-boats is to be cautious. In ordinary peace-time going into a harbour, picking up your buoy, going in and out of dock, and that sort of thing, they cannot be too cautious: if they risk their boats unnecessarily, it is a bad thing; but when once they are doing business outside, proceeding to or making an attack, then do not risk the chance of success by being over-cautious. If you are going to set the safety of the boats against every possible risk, there will sure to be a failure. The boat that remains in the beam when seen and thereby attracting the gun fire, or the boat that goes for the boom and either jumps over it and carries on the attack or sticks there and uses all her remaining resources to blow it up, those are the boats that make an attack successful, and not the boats that crawl slowly to avoid being seen. In this the Admiralty have always been most good. When boats in manœuvres have gone ashore through not being over-cautious, then they have taken no serious notice about it, and the consequence is now you always find Officers only too glad to go to torpedo-boats, since they feel they have a free hand, can use their sense, and have not always to exercise too great caution. One reason I disagree with divisional boats is that it destroys the individual sense of responsibility in the Captains of boats; it is much the same as in the case of a squadron where with a flagship the other ships are not so careful about navigation. If you have your torpedo-boats following the leading boat up the coast, they are not so careful with their individual navigation, and this will be intensified the more you provide the divisional boat with extra facilities for navigation. One way to prove this is, if you are leading the flotilla, to alter your course at night point by point, and then in the morning ask the other boats where they are. If they do not do their own navigation, they will not know how to do it when required. Then there is another thing about divisional boats. Boats can succour one another; they do not require the divisional boat. You get two or three torpedo-boats together, and if the Officers in charge are worth anything, they can help one another. Torpedo-boats can tow one another 10 or 12 knots without much difficulty, and they can succour one another and without the help of a divisional boat. If torpedo-boats are used as raiders, your divisional boats will be in the way; but if you are going to use them as scouts, they may be of use. If torpedo-boats are used in the anomalous position of doing their own scouting and making their own attacks as in the 1891 manœuvres, then a bigger class of boat would be of use to do the scouting, and not have to send your ordinary torpedo-boat out for miles on that work. Then as to retreat, I think the principle of retreat with torpedo-boats ought to be treated with very great caution. You must look at it in this way. When once there, it is far more dangerous to go back than to go on. If you are seen, there is far more chance for you in pushing on than in turning round and having a stern chase all the way back. There is one point that I do not think has been sufficiently considered, and that is, that if you are attacking ships in harbour and one of them is blown up, a panic will be created on the other ships at anchor. Everyone knows that a 20-lb. charge of guncotton will give a ship's bottom a good blow, and if you explode 100 lbs. of guncotton close to another ship, I believe there will be such a panic created that you will have all the magazines of the remaining ships cleared. That is another reason why you should push on and strike a successful blow. It is really the safest policy for yourself to adopt. I also do not see the use of feints. It always seems to me that if you are

close enough to make a feint, you are close enough to make an attack. In these torpedo-boat attacks, you are not merely dealing with old-fashioned edged tools you are dealing with a far more dangerous weapon, "guncotton," so you must expect to run more risks, and I do not think the boats ought to come back as long as a ship remains unsunk and they have a torpedo left. When once the attack is to be commenced, I think it should be clearly understood that each boat must act independently. One boat can get a shot off at one ship while another one cannot. You must attack independently, and then afterwards return either to a rendezvous or by yourselves. About getting out; if they can get in, I am perfectly certain they will get out much more easily, because all the ships will be employed either in looking after themselves or in looking after sinking ships. With regard to search lights, I quite agree with the lecturer. It is a fact that we have not got the slightest thing to go on in the way of experiment with search lights against torpedo-boats and guns. We have the results of a few experiments with search lights and torpedo-boats some few years ago by different observers on different stations, but there has never been anything really authentic of late years which has added materially to our knowledge on the subject of firing guns with search lights at torpedo-boats. It is one thing to find torpedo-boats, but it is a very different thing to keep your light on your boat and hit her with gun fire; therefore, whether your search light would be of any use or not in its present position is a point that I do not think has ever yet been satisfactorily decided.

Commander JOHN DENISON: My experience with torpedo-boats has not been so great as that of the last two speakers, but I should like to say a few words. It coincides with nearly everything they have said. The moral effect of torpedo-boats is very great. A fleet blockading an enemy's harbour must expect continual attacks from the torpedo-boats in the harbour, and nothing will tend so much to demoralize the men and Officers as these attacks. The lecturer has told us he thinks it is better to make separate attacks on a fleet by small divisions. I think, however, that if a fleet can be thrown into confusion by a general attack, the boats would have a better chance of getting in their torpedoes. As for torpedo-boats attacking ships at anchor in harbour, it will be a rather difficult thing for them to do, because a fleet anchored would naturally have guard-boats outside to check the torpedo-boats coming in. If they got in they would be expected, and the fleet would probably be able to deal with them. Then, again, torpedo-boats which have attacked a fleet at anchor, and are returning to their bases, must naturally expect to be chased. Their engines might break down; their coals might run short; their water might run short; and the chances are they would be overtaken and sunk, or destroyed. I quite agree with the torpedo Officers in thinking that we are inclined perhaps, to under-rate the value of torpedo-boats. They are always most useful and must be considered as great adjuncts to a fleet.

Mr. THORNYCROFT: I agree with the lecturer, and I feel that the meeting has taken the same view, to a great extent, that torpedo-boats are better adapted for sudden and unexpected attack, than to accompany a fleet, which was the function originally assigned to them. At the same time, I think too much stress has been laid on the idea that torpedo-boats are not able to keep the sea, especially as one speaker has told us that two French torpedo-boats were able to accompany the French fleet for six months. I think if torpedo-boats could, somehow or other, be organized in such a way as to enable them during bad weather, which is the exception, and not the rule, to find shelter, I think, there is no doubt, torpedo-boats might be of very great service. There is one thing I must regret, that is, that my firm has built its best torpedo-boats for abroad, and I think the evidence before us seems to show that increasing the power and size of boats enables them to act at greater distances and with greater promptitude. The experience we have had with boats of about 150 feet is that, really, in moderate weather, their speed is very little reduced by the waves. We have lately had information from Rio that a boat we sent out there made the voyage of 6,000 miles, and, on arriving there, was in such good condition that, with masts standing, awning and everything up, the boat was able to maintain a speed of 22 knots without any special preparation. In the best condition it made 25 knots, but after steaming 6,000 miles to maintain a speed of 22 knots says a great deal for the power of these boats. With regard to the

torpedo, I am not so well informed as to how perfect it is. We are told to-day that it has been greatly perfected, and now has a speed of 32 knots, and that it is perfect in every way; but it has been suggested that in actual fight, when ships get confused, it would be equally dangerous both to friend or foe. I think that is curable. There is no reason that they should remain so. I do not know if the torpedoes are so made, as it were, to lose their sting after so many seconds, because it is quite conceivable that it is not at all mechanically difficult to make them so far cut off their detonating apparatus as to render them quite harmless after they have made a run of some prescribed time.

Admiral COLOMB: We have had such a very excellent discussion, and so very close—one of the best I have heard here—that I do not propose to say very much at this late hour. But I feel, to a certain extent, a target on this question of torpedo-boats, and wish to say one or two words on the more general part of the question. The lecturer was cautious, as he has been described, in not giving too much force to the torpedo-boat; but he did give it immense force. Subsequent speakers, especially my friends from the "Vernon," have claimed that the torpedo-boat, by the lecturer, has been somewhat disparaged, that its force is very much greater than he seems to allow. Other speakers have followed in the same way, and the point which strikes me is that the whole of the discussion, or nearly the whole, to-day has been as if every speaker was on the side of the inferior naval force: that is to say, that the whole action described is the action of those who evade open, fair, downright warfare. There was a certain bard who tried to make a song that might suit the "Vernon," and the refrain of it ran something in this way, if I can only recollect it:—

"Yes we think this the straightest tip,
Fal lal lal la, fal lal lal la!
Presaging times not far remote,
Fal lal lal la, la!
'Twill cause our foes their flags to dip
When everything that moves afloat,
In either a big torpedo-ship
Or else a little torpedo-boat."

The point, which is quite a serious one, is this: That if the torpedo-boat is to be taken as we are now taking it, it means a great deal more than any speaker has as yet recognized. If things are to be as described, there is nothing to be said for the battle-ship, or for the heavy cruiser; scarcely anything for the smaller vessel, which is called the torpedo-catcher. We are getting a force—or we say we are getting a force—which is certainly to alter all that we know of the practice of warfare; and the point for us seems to me to be, how are we going to meet this? It is quite certain, I suppose, if torpedo-boat attack is what it is represented to be, we, in this country, are far more open to it than any other nation under the sun in war. Our ports are more numerous, our shipping is more numerous, our war-ships are a great deal more numerous; therefore they offer greater opportunity for attack. But we have not heard from any speaker that if the torpedo-boat is what is represented, what it behoves us to do is to guard against the torpedo-boat—that that should be almost our whole aim. If it can be said that the torpedo-boat herself is the answer to the torpedo-boat, let us go on with it. But we have not heard that said. And I do not see that we are paying any sort of that attention which we ought to pay not to resisting the attack when it comes, but to preventing the torpedo-boat attack, to prevent the enemy's torpedo-boats from issuing from their harbours, which, it seems to me, is the thing we have to look out for. I say this, because I think that it is the point most strongly brought before us by its remarkable omission in this lecture. I do not like to sit down without congratulating Mr. Laird Clowes most heartily for the lecture he has given us, and personally, on my own behalf, because if he had not done it I should have had to have done it, and I could not have done it with anything of the same skill and clearness, and lucidity, which he has brought to bear upon this subject.

Admiral Sir W. HOUSTON STEWART: There is no time to say much on this subject, which has so far advanced since my time of active service. I was the first

person who brought the torpedo-boat officially to the notice of the Admiralty, about twenty years ago. I was the first person who officially urged upon the Admiralty the importance of building a torpedo-boat for experiment. My suggestions, or my recommendations, on the subject were not attended to for a very considerable time, and we were much behind foreign navies for many years in torpedo-boats. The naval Officers at the Admiralty at that time did not consider that they were necessary for us. Having always held a different opinion, I therefore rejoice that the torpedo-boat, whatever may be the difference of opinion as to its application, has advanced so much more in consideration as an element of our Navy. But it is not as their advocate that I rise; it is as an old member of this Institution, to express my exceeding gratification that young Officers who have had practical experience themselves, and are therefore the best qualified to give us opinions on this subject, have come forward in the Institution and spoken, as they have done to-day, in such clear and admirable speeches. At the same time, I should like to express my great delight in having listened to such an admirable lecture from Mr. Laird Clowes.

Captain MAY, R.N. : I have very few words to say. Admiral Colomb has forestalled me. But looking at the fact that we are the people who will be attacked by the torpedoes, it more behoves us to defend ourselves than to scheme out plans of attack. Admiral Long has shown us that within 100 miles of the enemy's coast—140 miles, he said—we are within range of his torpedo-boats. There was one point which has not been traversed, but I think it ought either to be traversed or concurred in, and that is, that we are not to count on being attacked by torpedo-boats if we are fortunate enough to get the enemy's fleet to sea and have a fleet action. Admiral Colomb will bear me out if I say that 99 great sea-fights out of 100 have been within 100 miles of land. Are we to suppose that the enemy, who from the warfare that has taken place previously has gained experience and confidence in his torpedo-boats, will not take the boats out when he has confidence enough to bring his big ships out? I am perfectly sure if we are fortunate enough to get the enemy out, as Nelson got him out at Trafalgar, that he will bring out his torpedo-boats with him. How are we to meet them? Perhaps I have seen more experiments, or as many experiments, with the gun as most of the Officers in this theatre, and I am sorry to say, notwithstanding all we see on paper about the quick-firing guns and the number of projectiles that can be fired, the essential thing, the number of hits, has not, as far as I have seen, gone up so very much that we can be sure of stopping torpedo-boats by the gun. It appears to me that if these torpedo-boats are to be stopped and checkmated it must be by other boats. The big ships must trust to their small satellites, and the small satellites must hunt down the enemy's boats, and therefore, if we can get another lecturer as good as Mr. Laird Clowes to tell us how we can organize, how we can practise—because without peace practice there is no war efficiency—with these small satellites, and so hunt down and checkmate torpedo-boats, then I think we shall have advanced a step further in the tactics of the future.

Mr. LAIRD CLOWES (in reply) : I feel, as I said when I began my lecture, that the subject before us is really so wide that it is perfectly impossible to attempt to deal in the course of a single lecture with all the points which naturally crop up. I made my lecture as comprehensive as I possibly could. After I had written it, I struck out a great deal, because I found I could not get it in in the time, and I think it is unfair for critics of mine to come and say, "Well, you have not treated the electric light," and "You have not done so and so." I could not do any more in the time; it was actually impossible. With regard to the use of the electric light, that is a subject of a special lecture. You cannot treat it at the tail of a lecture like this. The only point upon which I want to speak is the fact that I have been charged by several speakers with a tendency to repress dash. Now it is not for me to encourage dash or otherwise, but it is for me to take the position of an outsider, and to speak as an outsider. It is not for me to pass any opinion upon whether an Officer ought to betray more dash or less dash; that is a matter for the Officer, and that is the point where one Officer differs from another Officer. But there are certain rules and general principles which must be recognized quite apart from the individual dash of Officers, and I certainly never had the intention of saying a single word which should tend to repress dash, because, as every one

knows, the whole of torpedo warfare must depend upon dash. The suggestion by Mr. Thornycroft that the sting of a torpedo might be taken away after a certain length of time seems to be exceedingly valuable. I think it would, if carried out, do away with some of the objections that may be urged against the employment of torpedoes in fleet action. If, supposing you missed your mark, the torpedo at once became harmless, you could fire your torpedo and feel perfectly happy that if it hit your own friend on the other side it would not do any damage. But at the present time if a torpedo is fired from a battle-ship, or a cruiser, or from a torpedo-boat, in a fleet action, and you do happen to miss your mark, you do not know where your torpedo is going, or what it is going to hit, and you would be likely to do as much harm to friends as to foes. With regard to Admiral Colomb, he starts an entirely separate topic, how to meet torpedo attack. That is, I think, a subject for several lectures, but I do not see how it can be dealt with to-day. First of all it would not bear upon the point which is before us, and, although it is interesting, I do not see why I should be reproached for not having touched upon it. For Sir Houston Stewart's kind observations I am very much obliged. With regard to the point raised by Captain May, I agree with him that fleet actions in the future, as in the past, are likely to be fought within a short distance of the coast. But the whole question of torpedo-boats with fleets does not depend upon the sea-keeping qualities of torpedo-boats so much as upon the fact that they cannot keep up in anything like bad weather with a fleet, when the fleet is doing 11 or 12 knots, and if you send a fleet to sea and hamper it by taking on a flotilla of torpedo-boats, which cannot do more than 11 knots, what is the use of giving your battle-ships 16 knots. I am sure I am very much obliged for the kind way in which my lecture has been received and spoken of by Officers who I fully expected would "jump" upon me.

The CHAIRMAN (Sir Geoffrey Hornby): Gentlemen, after the time that we have spent already in this theatre, I feel that the fewer words I have to say, the better. As an old Officer, who has nothing further to do, I believe, with torpedo-boats and torpedo-ships, except that I have a son in the Navy, I have this remark to make, that I think that the consensus of opinion appears amongst torpedo Officers to be that they are not very certain of their operations. I hope myself, therefore, that the ship in which my son navigates will not be blown up by one of these torpedo-boats! At the same time, I believe I had the honour to command the first squadron that went to sea with torpedo-boats, and I certainly looked upon them with great interest, and felt convinced that they had a great future before them. But I look upon their future as regards the squadron in two ways: they are the attackers certainly, but they are also the defenders. It is to my mind exactly the case of David and Goliath between the ironclad and the torpedo-boat. If the ironclad is not very quick indeed, the torpedo-boat will inevitably slip him, so that he falls a prey to a much smaller vessel. But there is one thing with regard to the torpedo-boat, which has been touched upon and which I endorse entirely, namely, that we do not give her her position in war. I do not consider that we have the means of judging what the position of the torpedo-boat in war will be; war itself must show. But I speak of what the torpedo-boat can do in time of peace. I look upon her as the most valuable vessel we have got to enable young Officers to learn what is of principal utility in their profession, that is, how to handle a vessel, how to handle it smartly, and how to handle vessels at great speed. I should like to see torpedo-boats of all sorts attached to our different squadrons, and made parts of those squadrons, as they must be when we get to war. When they are attached and working with squadrons, that is to say, a boat attached to each ship, there arises immediately a valuable rivalry between ship and ship and boat and boat, which does everything for improvement; whereas so long as they are simply in a school attached to a school you have the deadening effect of doing the same thing over and over again without there being progress. Another thing I have watched very carefully is the class of men we make by these torpedo-boats, and I am glad to say that they are a class which I hold in the highest respect. I am quite sure anything that is to be done with these boats will be done by these young men, and if I was going to sea again I should not trouble my head to tell them how they were to go into action. I look upon these young men as men who go straight

to the point when they can see it, and the probability is they will see it from the position they are in in their boats long before I can from my ship, and, therefore, I should leave that entirely to them. The only thing I should safeguard is that I should insist, before the action commenced, on giving them every protection I possibly could from those ironclads whose protection is the *raison d'être* of the attack on an opponent. I look upon it the ironclad and the torpedo-boat ought to look upon one another as comrades, the one protecting the other from fire, the smaller boat protecting the ironclad from that deadly weapon, which there is no doubt we ought to hold in great respect, and which I hope we shall do. I am sure we are very much indebted to the lecturer for a most interesting lecture, and also to those gentlemen who have said so much in elucidation of the subject.

Lieutenant-Colonel BAYLIS: We have already given a vote of thanks to our lecturer for his very able and instructive lecture, but I think we must all concur that we have another duty to perform, viz., to give a vote of thanks to Admiral of the Fleet Sir Geoffrey Hornby, for coming to preside on this occasion. His remarks to young men have been most admirable, and I am sure I hope they will go far and wide to encourage all young men in regard to what he said.

Admiral Sir HOUSTON STEWART: The honour of seconding this vote of thanks has been given to me, and I think it a very great honour. We owe our Chairman a vote of thanks not only for presiding here to-day, but for the most admirable instruction that he has given us. In that instruction he has followed out Nelson's ideas: he said to the young, tried and trusted man, "There is your enemy—go at him!"

The CHAIRMAN: I am much obliged to you for your kind remarks.

FOREIGN SECTION.

THIS portion of the Number, hitherto the Occasional Notes, has now become the Foreign Section, and is reserved for articles, either original or compiled, on professional subjects connected with Foreign Naval and Military matters; also for notices of Professional Books, either Foreign or English.

The Council of the Institution wish that this section shall be developed still further, and I have undertaken to continue my Editorship during the current year, with a view of aiding them in carrying out this work. It seems to me possible to make this section, and consequently the Journal, the means of keeping our Members acquainted with all naval and military progress abroad *pari passu* with that progress; and I shall be glad to receive from members of both Services, including in the latter those of the Auxiliary Forces, suggestions, information, or offers of assistance.

It is desirable, further, that I should state that, as regards editing the Naval matter in the Section, I shall have the aid of Naval Officers, thoroughly competent to give good advice and to pronounce sound opinions.

It must, however, be borne in mind that, as the change from a quarterly to a monthly issue has been made in order to ensure the more prompt publication of the Lectures after their delivery than has hitherto been the case, the Foreign Section will, as a rule, be restricted in extent during the Lecture season in the first half of the year, and will be prominent in the second half.

It is requested that communications and books for review (the latter under cover to the Librarian) may be addressed to me at the Royal United Service Institution, Whitehall Yard, London, S.W.

LONSDALE HALE,

Colonel R.E. ret.

PROFESSOR FRÖLICH'S NEW METHOD FOR DETERMINING THE VELOCITY OF A PROJECTILE IN THE GUN.

Translated from the "Rivista Marittima" by THOMAS J. HADDY,
Chief Engineer, R.N.

A NEW method for determining the velocity of the projectile during its passage through the gun, is the result of a series of experiments carried out by Professor Frölich in order to demonstrate and analyze the movements of telephonic membranes.

To explain the method, I ought, naturally, to go through this series of intelligent researches, but at the present I will only observe that it aims at doing away with the necessity of piercing the gun at various points, as is necessary in using the chronographs of Boulangé, Siemens and Halski, Bashfort and Sebert, an advantage which, according to all the evidence, would be of no little utility.

Professor Frölich set out on his researches with the following conception, viz., that:—

In spite of the great diffusion of the telephone and the numerous investigations carried out on its effects, until about three years ago no investigation had succeeded in demonstrating experimentally the movements of the telephonic membrane, and, as a consequence, to indicate by experiment the properties of these movements.

In general, the experimental demonstration of the movements of the telephonic membrane is simple enough, if we pass through the telephone alternating currents sufficiently intense, by means of a tuning-fork actuated electrically; but the same experiment becomes much more difficult when the telephone is acted upon simply by currents produced by the act of singing or speaking into another telephonic or microphonic apparatus. In fact, if, in order to have a trace of the vibration of the membrane, we cover it with lycopodium powder, it is not possible to recognize in this latter case any sonorous figure whatever.

We have, however, proof of the movements of the membrane if (on the idea of Professor Frölich) we fix firmly on the vibrating membrane, in an eccentric position (as nearly as possible in the middle of a radius), a small mirror so that a luminous ray can be reflected from it on to a diaphragm, as in Fig. 1.

By this means we observe a small movement and can measure it if, with the above arrangement, we add a microscopic lens and a graduated scale. Under these conditions at the laboratory of Siemens and Holske, at Berlin, they have been enabled to state that the maximum movement was 0.035 mm.

After this result, it was wished to render the demonstration more evident, by the transmission of the vibrations of the telephonic

*Professor Frölich's
new method of determining the velocity
of a projectile in the gun.*

Fig. 1.

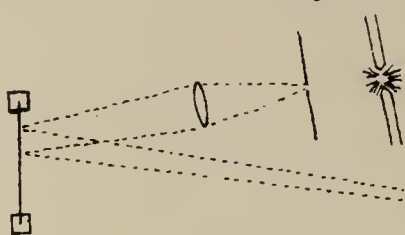


Fig. 2.

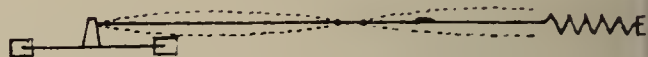


Fig. 3.

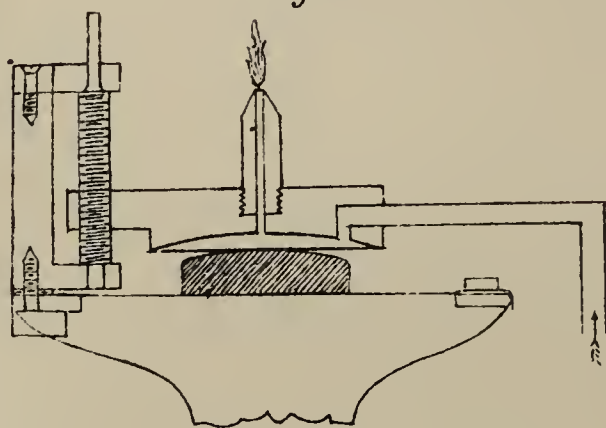


Fig. 4.

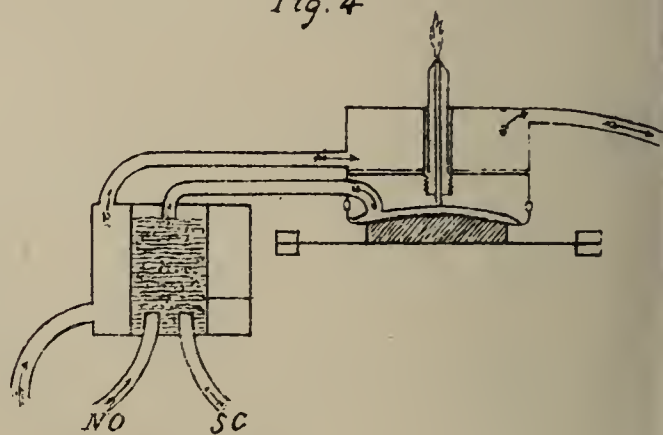


Fig. 5.

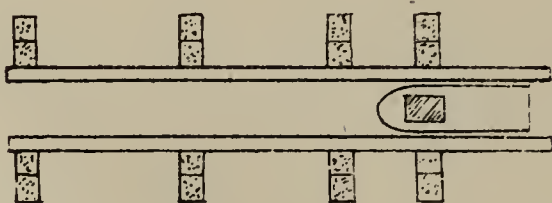


Fig. 6.

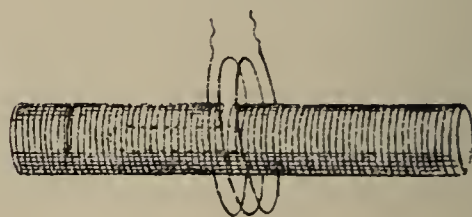
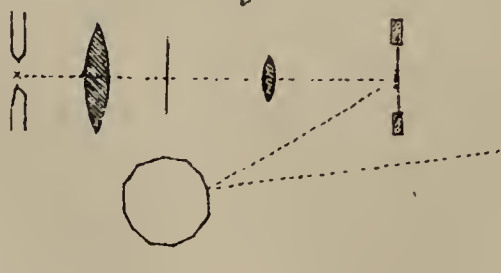


Fig. 7.



membrane to a metallic cord fixed at one extremity to the membrane, and held in tension by means of a spiral spring attached to the other, as shown in Fig. 2; the metallic cord in the said experiment had a length of 40 cm. and a diameter of 0.6 mm.

With this arrangement, on passing the alternating currents of an electric tuning-fork, vibrations of the cord of an amplitude of 5 mm. were observed. The amplitude of the vibrations were afterwards largely increased by the addition of a small mirror fixed on the cord between the loop and node of the vibration, and by this means (not by the somewhat intense action of the tuning-fork, but simply by that of the voice singing into an ordinary microphone) movements from the diaphragm have been obtained even up to 50 cm.

However, although by these experiments the movement of the telephonic membrane (which, previously admitted by all, up till now had not been demonstrated experimentally) must be classed amongst the number of verifications obtained, still it is to be observed that the method above described does not lend itself to the study of the vibrations of the membrane, since the vibrations of the cord are essentially different from them. With a view of brevity, I leave out of consideration at this point any of the experimental demonstrations on the changes of timbre produced by the different methods of vibrating the telephonic membrane which Professor Frölich has given by means of the acoustic figures of Lissajoux, and will proceed in explanation of the experimental methods for obtaining a direct optical representation of the movements of this membrane.

As we know, one of the finest experiments in acoustics is that of the sensitive flame or dancing flame of König, by means of which we can directly represent the vibrations of the membrane. If a capsule, through which an inflammable gas is passed, be mounted on a vibrating membrane and the gas be lighted, the flame will assume a vibratory movement on the slightest agitation of the membrane, and on observing the image of the flame on a system of revolving mirrors, we notice a series of undulations more or less profound in correspondence with the vibration of the membrane. This experiment in acoustics, although well known, had not been applied by anyone to the study of the movements of the telephonic membrane before so applied by Professor Frölich, because these movements are about twenty times smaller than those produced in the usual acoustic experiments. Wishing to show that the experiment above indicated was possible, Frölich introduced the following modifications:—

In the middle of the telephonic membrane he fixed a small piece of cork, curved on its upper surface, on which rested a capsule having a chamber and very fine tube, and provided with an exceedingly thin membrane forming the bottom of the chamber, the whole adjustable to the greatest nicety by a micrometric screw, as shown in Fig. 3.

With this arrangement Frölich was able to represent the telephonic vibrations as clearly as in the acoustic experiments of König, the enlargement obtained being considerable. Again, with a view of brevity, I omit mention of the known results in the variation in timbre, the different vowels and consonants, and the essential

difference existing in the oscillations of the telephonic membrane and those of the membrane against which we speak directly, result which, in their conclusions, are demonstrated to be in accord with those obtained on an artificial telephonic line, corresponding with that between Paris and Brussels or Berlin and Hanover. Evidently if in any way we can succeed in fixing the image produced by the telephone and sensitive flame, this apparatus will become a measuring instrument that may be applied to a great number of important problems. For the rest, the above images express, although somewhat imperfectly, a measure of the relative movements of the telephonic membrane. In order to fix these images, we can have recourse to two methods, drawing by hand, and photography. Drawing, for the end we are speaking of, is shown to be too imperfect, and in any case for it to be at all satisfactory it is necessary to regulate the velocity of the revolving mirrors so as to obtain images with sufficient rapidity of reproduction as to appear fixed. It would be sufficient, however, to draw the characteristic parts only, especially the maxima and minima, and with a graduated scale the height of these points could then be measured. For greater accuracy we must have recourse to photography, but, again, this method presents difficulties, the duration of a point of the flame being so excessively short. The only means amongst the many experimented on which has given images sufficiently clear, is that proposed by Professor Sell, in which the flame consists of a combination of bisulphuret of carbon and protoxide of azote.

The arrangement adopted was that represented in Fig. 4.

With this the two gases combine in a chamber provided with a metallic cloth partition, traverse the closed capsule of the membrane, and ignite on exit. The whole of the circulating passage is maintained at a proper temperature to prevent the precipitation of the sulphurous carbon, by means of hot water. It being thus rendered possible to obtain sufficiently clear images of the points of the flame, numerous applications have become feasible; I will mention, but not describe, among others, the following:—determination of the curve of intensity during the variable period of a current; representation of the charging and discharging of an electric condenser; variation of the currents of the alternating current machine, thanks to which, can be put under direct proof all the changes that can be made in machines of this kind; application to chronography. This last application admits in its turn of many others. By means of a photographic plate divided into many parts, and each of these being attached to the face of a revolving polygonal system, we may repeat the celebrated experiment of Wheatstone on the velocity of the propagation of electricity, and this method is certainly superior to many others of the same nature of research, because the telephone would furnish the means to follow directly the movement of transmission along a line. In the same order of facts, the idea presented itself to Professor Frölich that the apparatus might be used advantageously for the determination of the velocity of a projectile in its passage through the gun. Instead of piercing the arm at various distances in

order to introduce insulated wires charged by means of the Leyden jar, and connected with electromagnetic apparatus and traversed by currents from the pile battery or accumulators, which are broken in the passage of the projectile, the desired result may be obtained in the following manner. First, it is sufficient to furnish the projectile (of lead, suppose) with a piece of soft iron, and to coil round the outside of the gun a system of spirals, composed of a primary wire, traversed by a current of a certain intensity, and by a secondary wire joined to a telephone (Fig. 5), to this should be then connected the proper accessories for the registration of the indications which have been previously chosen.

Evidently the projectile in its course will set up alternating currents (in the coils), and we know that in a closed circuit the electromotive force of induction is equal in value at every instant to $\frac{dQ}{dt}$ for the time that the flow of force traverses it, and the intensity of the induced current is $I = \frac{dQ}{Rdt}$ if R is the resistance of the circuit in which it circulates.

Now, if K is the coefficient of magnetization of the iron employed, the intensity of magnetization would be $I' = KH$. H representing the magnetic intensity of the field, and if B and μ respectively represent the flow of induction per unit of surface (or magnetic induction), and the coefficient of magnetic permeability of the iron :—

$$\begin{aligned}\mu &= 1 + 4\pi K, \\ H &= 4\pi n_1 i,\end{aligned}$$

approximately; n being the number of coils per unit of length and i the intensity of the current in the primary circuit (Fig. 6).

$$\text{Then,} \quad B = \mu H = \mu \times 4\pi n_1 i = 4\pi n_1 i(1 + 4\pi K),$$

and for the whole section S of the bar and for n coils of the secondary circuit

$$Q = nBS = 4\pi n_1 niS(1 + 4\pi K).$$

If, then, we consider S' to be the section of the soft iron nucleus and S the section of the coil of the primary circuit (as the figure represents) the total flow that would traverse the n coils of a secondary system connected with the telephone would be—

$$Q = nH(S - S' + \mu S') = n \times 4\pi n_1 i(S + 4\pi KS'),$$

which is reduced to the above expression for $S = S'$.

Now, photographing the variations of the current by the method indicated, we have a means of determining (according to the velocity of rotation of the revolving system and the intervals between the maxima of the curve) the interval of time employed by the projectile in passing from one system of coils to another, that is, to traverse a known distance.

Though this remains in principle the new method to determine the velocity of a projectile in the gun, it is still necessary for us to continue the series of researches as carried out by Professor Frölich, because it will be seen from them that the modes of obtaining the registrations which serve to calculate the velocity of the projectile may be notably different. Incidentally we may observe, as is evident, that if we find a method by which the vibrations of a telephonic membrane can be directly observed and fixed, we have a method of representing the electrical undulations of the alternating current, since (analogously to what is indicated in the method described) the telephone can be employed for the observation of the strongest alternate currents circulating in the primary circuit, if, by means of a secondary circuit, we send into them only currents of small power.

Now the modified method of the sensitive flame of König, although it renders possible the studies we have been considering, is shown to be insufficient for the purposes of exact research, such as the determination of the velocity of projectiles, since the picture of the images produced is always very imperfect, and the different attempts to photograph these images have not resulted in any practical and simple method.

The means that may be employed to fix these undulations rest either upon a mechanical or optical basis.

In the phono-autograph the vibrating body is furnished with a fixed point which rests lightly upon the smoked surface of a cylinder on the phonograph the vibrations are impressed by means of a point on the tinfoil surface of a revolving cylinder, and by causing another point to pass over the impressions caused by the first we can reproduce the same vibrations on another sheet of tinfoil, or increase them by a suitable mechanical arrangement for the transmission of the movement.

Amongst the optical methods, that of Lissajoux is especially remarkable, because it serves to produce fixed images by means of another vibrating body, and we can then deduce, by a process of developments, the vibratory curve of one body, if the figure of the vibrations of the other is known.

The other methods make use of revolving mirrors, usually mounted in the form of a cube, which is caused to revolve on a central axis parallel to the surfaces to which the mirrors are attached; the direction of vibration must be parallel to the axis of the rotating system. This method, applied under different forms in physics, has, unfortunately, the inconvenience that it does not give direct or fixed images.

In order to represent the images, Fedderson made use of concave mirrors, causing the reflected ray to fall on a plane surface of glass and on a photographic slide, on which he obtained images of a very clear outline. This arrangement has been adopted in representing the electric spark. Oettingen modified this method by returning to the use of plane mirrors, throwing the reflected ray on a photographic slide, or on a revolving polygonal system of which the facets consisted of photographic plates. Professor Girard applied this last

system, but in which he substituted a cylinder covered with sensitised paper for the polygonal system, and for the light he used an arc light or the sparks of a Rhumkorff coil projected uniformly, so that the periodical regularity of the sparks might also serve as a measure of the time.

Frölich, observing that all these methods had their advantages and defects, saw also that some of them furnished that which he sought to obtain.

The phono-autograph, although its construction and mode of registration is simple enough, nevertheless does not give exact results, partly by reason of the friction of the point against the hard surface, and partly by the variable elasticity of the scribing point. Now the friction cannot possibly be prevented, even in the most perfect apparatus, as many unsuccessful attempts of the Siemens and Halske firm have shown; again, it is controllable with difficulty, and gives irregularities sufficiently noticeable in the curves of vibration of bodies.

These curves of vibration also change by reason of the mechanical resistance of the tinfoil, and it is for this reason that the sounds produced by this instrument differ from the original notes by having a more acute timbre. Besides this, one can imagine that it would be very difficult to construct an instrument for enlarging the impressions made on the surface of the phono-autograph so as to reproduce them without any error whatever.

The optical methods are exempt from these mechanical defects, but unfortunately they have others.

The method of Lissajoux has the property of showing the difference of phase by means of a curve of simple form, and possesses, besides, the great advantage of giving fixed images. Notwithstanding this, it is necessary to know with great exactness the curve of vibration of another body, and in any case what we see is not the required curve of vibration of the body, but the combination of two curves. The first is not obtained but by a process of development which we cannot entertain when treating of a curve of complicated form.

The method of the revolving mirrors of the ordinary form does not give fixed images. With the systems of Fedderson and Oettingen we have the images photographed, but they do not lend themselves to the study of all the facts, because they are too small. Besides these arrangements, without introducing some improvements in them, are suited only to the observation of phenomena which are produced once only, but for continuous vibrations (as in the case of many sung notes) we should obtain results too confused to be able to obtain from them any serious conclusion. Professor Frölich observed, also, that the method of Professor Girard and that proposed by him in 1887 did not furnish to the eye, during the experiment, any curve; so that he considered it necessary to continue his researches by means of the rotating mirrors so as to obtain images that could be drawn or photographed immediately, and, in either case, that they should be plainly observable during the experiment. In the new method recently definitely fixed upon, Frölich used a ray of light from an arc lamp

placed inside a box, which ray he caused to traverse two lenses, the one before, the other after it passed through the aperture in the box, and that he then reflected by a mirror placed at the centre of a radius of the telephonic membrane, and by a polygonal system of rotating mirrors on to a transparent diaphragm or photographic plate. (Fig. 7.)

If, up to this point, we have any notable improvement in the primitive method, it consists in having provided the greatest possible accuracy in the adjustment of the plane mirrors, since without this, instead of obtaining a constant curve during the rotation and the passage of a continuous current, we should have a most confused series of curves. He has also provided for the production of curves stable enough to be observed and measured with ease and accuracy.

In order that the curves should appear fixed, each mirror must be so adjusted as to reflect the same ray to exactly the same place, and as a consequence the velocity of rotation of the system must be in a determined agreement with the velocity of production of the vibrations which we wish to represent. Now if V_s expresses the number of revolutions per second of the revolving mirrors, and m is the number of mirrors, that is the number of faces of the polygon, $\frac{1}{V_s}$ will represent the time employed to complete one revolution, and $\frac{1}{mV_s}$ will be the time between the arrival of two successive rays from the prism at the same plane. This last must be an exact multiple (n , suppose) of the duration T of a vibration of the vibrating body in order that the image should be a fixed one; therefore—

$$\frac{1}{mV_s} = nT, \quad T = \frac{1}{nmV_s}.$$

If, for example, the vibrating body is a telephonic membrane, and its vibrations are produced by means of an alternating current machine, which is mechanically connected with the rotating system, V_m being the number of revolutions of the machine per second, and x the number of complete periods of the current per revolution, the duration of the complete period will be—

$$T' = \frac{1}{V_mx},$$

and the conditions satisfying the production of a fixed image will be that—

$$T = \frac{1}{V_mx} = \frac{1}{nmV_s},$$

or that

$$\frac{V_m}{V_s} = \frac{nm}{x} = p.$$

p will then be the relation that must exist between the velocity of the rotatory system and that of the machine; naturally, though n , m , and x may be whole numbers, p cannot be.

We might easily succeed in obtaining the above relation by a system of toothed wheels, arranging that the vibrations are produced by a body put in movement so that there should be a constant connection between the velocity of rotation of the machine, the revolving mirrors, and the vibrations of the telephonic membrane. The method described of fixed images in constant relation to the velocity of the generator and the revolving mirrors has the advantage that the length of the wave of the image is independent of the velocity of rotation. With an apparatus accurately constructed the number of revolutions (which changes simultaneously at the generator and at the revolving system) can be modified at will, without modifying the length of the wave of the image, and, as a consequence, the construction of the apparatus can be arranged so as to produce the length of wave required.

The angle that the reflected ray from the mirror describes in the time that the system completes one revolution is $\frac{4\pi}{nm}$ (with the supposed data), and the length of the wave is $\frac{4\pi R}{nm}$, if R is the distance of the transparent diaphragm from the axis of the revolving mirrors.

In execution of this plan we may follow two methods, as in the experiments of Lissajoux, one objective, the other subjective. The first has been indicated, and we can obtain by it images susceptible of being drawn or photographed, but we have need of the intense light of the arc lamp. In the subjective method we use a petroleum lamp instead of an arc lamp, and a microscope instead of the diaphragm; we then obtain curves of light but cannot register them; on the other hand the apparatus becomes easily portable.

A special study of the qualities of the membrane must be made, the desired end being to find one that has no influence of its own, or the least influence possible, on the reproduction of the undulations. Professor Frölich has also studied this most important part of the subject, both theoretically and experimentally, but does not appear to have yet arrived at any definite conclusion. Up till now, the telephonic membrane of iron has shown itself to be the best, and this is also in agreement with what constructors of telephones have recognized to be also the best for the transmission of speech. In addition to this, in order for the apparatus to act with sufficient accuracy it is necessary that its construction should be of the greatest exactness, and its installation perfectly frigid.

In favour of the representative method above described, without entering into a long enumeration, we can understand how the application of it may be extended in the field of acoustics and electric vibrations in whatever manner they may be produced.

THE NAVAL SCHOOLS OF THE CHIEF CONTINENTAL POWERS. PART V.

(Concluded from No. 171.)

Compiled by Major W. TENISON, the Manchester Regiment, from papers in the "Rivista Marittima," by 1st Class Commissary DANTE PARENTI.

Italy (continued).

In awarding marks in the written examinations, particular notice is taken of the candidate's handwriting.

In oral examination, two questions chosen at haphazard are set to each candidate in each subject. The Board has, however, the power to set a greater number of questions, if found necessary. Every candidate who fails to obtain 10 marks in arithmetic and Italian is debarred from continuing the examination. Those who obtain not less than 10 marks in these two subjects are permitted to continue the examination, and are declared successful if they obtain an average of 10 marks in all subjects. The votes of the examiners for each individual candidate are taken in the following manner: each examiner is furnished with a certain number of black and white balls, with which he records his vote as to the fitness of the candidate. This takes place secretly. Afterwards, by means of marks from 0 to 20, the candidate's position in the final classification is fixed. All who obtain 9 and under are returned unsuccessful, whilst those who obtain 10 and over are passed. The result is published. The averages of marks for classification in each subject are obtained for every candidate by adding the marks given by each individual examiner, and dividing the total by the number of examiners.

The final average is obtained by multiplying the marks obtained in each obligatory subject as above by the corresponding coefficient, adding together the products and dividing the total obtained by the sum of the coefficients. Any candidate who has obtained the required average, and has passed as well in voluntary subjects, takes precedence of those who have obtained the same marks in obligatory subjects only.

No repetition of the examinations is ever allowed.

The decision as to the admission of a candidate rests in every case with the Minister of Marine.

A certain number of non-commissioned officers are attached to the school as assistant instructors in professional subjects. They are divided equally amongst the classes and courses, and attend all military and naval exercises.

The students are divided for study into five classes, the first

class comprising all the latest admissions to the Academy. Each class constitutes a squadron, and all the squadrons together a brigade of students.

As far as the exercises are concerned, the students are classified as follows :—

- a. “Brigadiere.”
- b. Student “Graduato.”
- c. Simple student.

And for studies as—

- a. Chief of the class—Capo Classe.
- b. Second of the class—Sotto-Capo Classe.
- c. Simple student.

The “Brigadieri” and the Students “Graduati” are appointed by the Council of Discipline from amongst students in the 5th class who, in addition to having distinguished themselves by their conduct and progress, possess authority and a military presence. Their nomination takes place at the commencement of the scholastic year, and they retain their appointment until the end of their term, unless deprived of it for misconduct. They have no direct disciplinary authority over the other students; but by their conduct and military bearing set them a good example. They must strive to maintain the harmony and *camaraderie* of the whole establishment. In the organization of squadrons into brigade they discharge the duties of sergeants and corporals, and as such bear on the left arm a distinctive badge, established by the Commandant.

At the commencement of each year the Council of Discipline nominates the Capo and the Sotto-Capo of each class, in accordance with the classification at the end of the last examination, excluding those whose conduct has not been satisfactory. In any case, in order to be appointed Capo or Sotto-Capo, a student must be amongst the first five of his class, and he may be deprived of his appointment during the term for misconduct or if he shows himself unworthy of such distinction.

As soon as they complete their seventeenth year the students may enrol themselves voluntarily. Such enrolment is authorized by the Minister of Marine, after it has been laid before him by the Commandant of the Academy, together with the approval of the parent or guardian, duly authenticated. These enrolled students, in addition to being, like the others, subject to the interior regulations of the Academy, are under the Military Code and Discipline Act.

Punishments.—The following are the punishments which may be inflicted in the Academy :—

1. Bad marks.
2. Punishment drill during hours of recreation from 1 to 5 days.
3. Punishment table from 1 to 3 days.
4. Stoppage of leave from 1 to 4 weeks.
5. Simple imprisonment from 1 to 10 days.
6. Close imprisonment from 1 to 10 days.

7. Arrest during the vacations preceding or following the cruise.
8. Loss of marks of distinction.
9. Severe reprimand.
10. Detention in a military prison from 1 to 3 months.
11. Enrolment into the "Corpo Reale Equipaggi" if the student is voluntarily enrolled, or expulsion if the student is not enrolled.

All the punishments from 1 to 9 must be inflicted by the Commandant. Only in the case of immediate and pressing necessity may any superior inflict No. 2, or an Officer order simple imprisonment, and even then a report must be immediately made to the Commandant, who fixes the length or manner of punishment. Nos. 10 and 11 are inflicted only by the Ministry of Marine on the recommendation of the Council of Discipline.

All punishments, except only Nos. 1, 2, 3, and 4, are entered in the culprits' reports. Bad marks are awarded for minor offences, such as neglect or slight acts of misbehaviour, want of attention or application during studies or lectures, and failure in obtaining marks for questions set in the classes; and their effect is to annul good marks previously obtained, or to subject the student to one of the punishments Nos. 3, 4, 5, and 6, according to the laws set by the Commandant.

No. 2 is inflicted for slight misconduct and inattention to orders, and may be accompanied with bad marks.

The punishment table is imposed specially for inattention in class and neglect of studies, and the effect is that the students so punished take their meals at a separate table, and are deprived of one of the courses and wine and fruit at breakfast and dinner.

Stoppage of leave is inflicted for breaches of discipline which do not require immediate repression, or for habitual neglect. It may be awarded in conjunction with any other punishment, or on account of repeated punishment during the preceding week, as may be laid down in the rules published by the Commandant.

Simple imprisonment is awarded in cases of serious breaches of discipline, and habitual negligence in studies.

Any student sent out of class must consider himself punished with simple imprisonment; on the award of the punishment, the student is locked in in a room kept for the purpose, and does not leave it except to attend lectures and exercises; he is also placed on prison diet of bread, broth, and meat.

On board ship the punishment is carried out between two of the guns.

Close imprisonment is awarded in cases of more serious breaches of discipline, and where the culprit shows himself indifferent to punishment. This is carried out in a room specially constructed, which the student is not allowed to leave; he does not attend lectures, and is placed on a ration of bread and broth only. On board ship this is carried out in any place that the Commandant may appoint, sanitary exigencies being taken into account. Prisoners

are deprived of their bedding, and sleep on a guard table furnished with one blanket; during exceptionally cold weather in winter extra covering may be supplied them.

Arrest during vacations is inflicted by the Commandant, on the advice of the Council of Discipline, for complete or partial failure to pass the yearly examination, and for serious breaches of discipline following upon close imprisonment.

A student punished with close imprisonment loses a good-conduct badge; if sent back at the yearly examination he loses all good-conduct badges.

The badges of "Capo" and "Sotto-Capo" of the class and of student "Graduato" are lost for breaches of discipline. A student in possession of a good-conduct badge for studies loses it if he is not placed amongst the first six in his class in the yearly examination.

Severe reprimand is inflicted on any student who proves himself indifferent to the above-mentioned punishments, in the presence of all the Officers and students of the Academy. This is always accompanied with the maximum amount of close imprisonment, and bears with it a threat of expulsion.

Detention in a military prison is awarded to students guilty of the gravest breaches of discipline, and specially to ringleaders in disturbances.

Enrolment to complete the term of service in the "Corpo Reale Equipaggi" is carried out in the case of:—

1. A student who has proved himself indifferent to all other punishments;
 2. A student guilty of the gravest breaches of discipline;
 3. A student sent back a second time at the yearly examination;
- but this punishment is inflicted only on voluntarily enrolled students.

Rewards and Distinctions.—1. Marks of merit are awarded to students for special application in study, at the military and naval exercises, and for good conduct, and carry with them rewards established by laws published by the Commandant. Marks of merit for studies only cancel bad marks in studies, and those obtained for good conduct only bad marks for conduct.

2. A good-conduct badge is gained by a student who during six months has been awarded no higher punishment than No. 3, and who has obtained no less than 12/30ths of the marks in each subject at the monthly classifications during the same period. Any student who joins the Academy from a military college with good-conduct badges retains them on admission. This badge consists of the royal cipher embroidered in gold on black, with gold sceptre below. Within the cipher is embroidered in silver a horizontal bar for each good-conduct badge obtained by the student.

3. Badges for Studies.—A student who for two consecutive years has obtained a general average of not less than 16/30ths of the marks at the examinations for promotion, and is placed amongst the first ten in his class, obtains the Royal Badge of Merit for Studies, provided his conduct and professional qualifications admit of it. A

second and a third badge may be gained if the student continues to satisfy the above conditions.

This badge consists of the royal cipher embroidered in gold on red ground, with gold sceptre below. Within the cipher is embroidered in gold a horizontal bar for each badge obtained.

In the case of a student being in possession of both badges for good conduct and studies, the horizontal bars of gold are interlaced with those in silver within the royal cipher.

The student who during his last three years retains the first place in his class receives on his leaving the Academy, in addition to the yearly prizes, a sword of honour with his name and the date of the award engraved on the blade. The names and photographs of these distinguished students are preserved at the Academy, as a record of their achievements, and as an example to all others.

Leave of Absence.—Free leave is granted to students in the 4th and 5th classes on every Sunday, within the limits allowed by the timetable. This is called ordinary leave, and the Commandant has power to either shorten or suspend it for service or sanitary reasons.

The students of the 1st, 2nd, and 3rd classes have no free leave of absence; they go out only accompanied by an Officer. Those who have living in Leghorn either parents, guardians, grandparents, uncles, brothers, or other relations may go out in their charge. These relations, in every case, must be of age, and must furnish to the Commandant a declaration from parents or guardians proving their relationship.

Organization of Studies.—The scholastic year begins on the 15th October, and ends on the 30th June of the following year, at the conclusion of the yearly examination.

Instruction is imparted in the various classes in the following subjects (the coefficient by which the marks obtained are multiplied to arrive at the general classification is appended to each subject):—

1st Class.

1. Elementary Algebra, 3.
2. Plane and Solid Geometry, 3.
3. Italian, 3.
4. Political History, 3.
5. Geography, 2.
6. French, 2.
7. Drawing, 1.
8. Professional Instruction and Exercises, 1.
9. Gymnastics, Fencing, &c.

2nd Class.

1. Algebra, 3.
2. Rectilineal and Spherical Trigonometry, 3.
3. Plain Navigation, 3.
4. Italian Literature, 2.
5. Political History, 2.

6. Geography, 2.
7. French, 2.
8. English or German, 2.
9. Drawing, 1.
10. Professional Instruction and Exercises, 1.
11. Gymnastics, Fencing, &c.

3rd Class.

1. Algebra, 3.
2. Analytical Geometry, 3.
3. Descriptive Geometry, 3.
4. Elementary Astronomy, 3.
5. Physics, Part I, 3.
6. Italian Literature, 3.
7. Political History, 2.
8. French, 2.
9. English or German, 2.
10. Artistic Drawing, 1.
11. Professional Instruction and Exercises, 2.
12. Gymnastics, Fencing, &c.

4th Class.

1. Infinitesimal Calculus, 3.
2. Nautical Astronomy, 3.
3. Physics, Part II, 3.
4. Italian Literature, 3.
5. Natural History, 3.
6. Political History, 2.
7. French, 2.
8. English or German, 2.
9. Artistic Drawing, 1.
10. Professional Instruction and Exercises, 3.
11. Gymnastics, Fencing, &c.

5th Class.

1. Mechanics, 3.
2. Astronomical Calculation, 3.
3. Artillery, 3.
4. Naval Construction, 3.
5. Steam Engines, 3.
6. Naval Manœuvres and Tactics, 3.
7. Hydrography and Topography, 3.
8. Submarine Mines, 3.
9. Chemistry, 3.
10. Conversational English or German, 3.
11. Professional Instruction and Exercises, 2.
12. Gymnastics, Fencing, &c.
13. Telegraphy, 3.

The Training Cruise.—At the end of the yearly examinations the students embark on the ships attached to the Academy for a four months' cruise. The Rear-Admiral in command of the Academy assumes chief command, and the staffs of the several ships are formed by the Officers of the Academy, together with a full complement of men, &c., and in addition those non-commissioned officers whom the Commandant thinks necessary as assistant instructors.

Time Table.

	Week Days.	Holy Days.
Reveillé	5.0—5.30	5.0—5.30
Study	5.30—7.20	5.30—7.20
Arranging books and recreation	7.20—7.30	7.20—7.30
Breakfast	7.30—7.45	7.30—7.45
Medical inspection and recreation	7.45—8.10	7.45—8.10
Inspection	8.10—8.15	8.10—8.15
Lectures	8.15—11.15	—
Mass and religious instruction	—	8.15—9.0
Practical exercises	—	9.0—11.15
Punishments—lunch	11.15—12.0	11.15—12.0
Relaxation	12.0—12.30	12.0—12.30
Study	12.30—1.25	—
Lectures	1.25—4.0	—
Arranging books and recreation	4.0—4.10	—
Exercises	4.10—5.10	—
Change of clothes and inspection of the students with free leave and leave with parents, &c.	—	12.30—1.0
Leave of absence	—	1.0—5.0
Study for students remaining in the academy ...	—	12.30—1.30
Change of clothes and inspection in the academy	—	1.30—2.0
Walking out (obligatory)	—	2.0—5.0
Recreation	5.10—5.20	—
Change of clothes	—	5.0—5.20
Dinner	5.20—6.0	5.20—6.0
Recreation and relaxation	6.0—6.45	6.0—6.45
Study	6.45—8.45	6.45—8.45
Recreation	8.45—9.0	8.45—9.0
Bed	9.0	9.0
Lights out	9.10	9.10

Other Schools.

School of Machinery.—Established at Venice for the instruction of youths intending to enter the profession of naval engineers.

The Staff of the school is composed as follows:—

A Captain or Post Captain as Commandant.

A Lieutenant as Company Officer.

Two Officers as assistants.

Four engineers as Officers of the watch and Instructors.

An administrative Officer in charge of accounts, &c.

A Medical Officer.

The Civil Staff consists of nine Professors and four Masters, and a certain number of servants, porters, cooks, &c.

There is also attached to the school a detachment of men of the *Corpo Reale Equipaggi* for military purposes. The instruction is theoretical and practical, and the subjects of instruction are divided into four classes, one for each year of attendance at the school.

The admission of the pupils takes place every year, and is open to Italian subjects who fulfil the necessary conditions, that is to say:—

1. Who have a constitution which fits them for the duties of the Service.

2. Who have completed fourteen years of age, and who are not more than eighteen years of age on the 10th July of the year of admission.

3. Who have passed through an apprenticeship as ironfounder, boiler maker, forger, or joiner.

4. Who are acquainted with simple arithmetic, Italian grammar, the rudiments of rectilinear drawing, and have a good hand-writing.

The candidates are examined orally in plain arithmetic and in writing as follows:—

1. In the solution of a problem in arithmetic proportionate to the standard fixed for the oral examination.

2. In Italian composition, to show that the candidate is acquainted with the orthography and the grammatical rules of the language, and that he possesses a good hand-writing.

3. In the graphic solution of an elementary problem in rectilinear drawing, and in copying a very simple design of a piece of machinery.

The practical examination consists in the execution, in the presence of the Board of Examination, of some work in one of the workshops of the Royal Arsenal.

The following coefficients are assigned to the various subjects of examination:—

Arithmetic, 3; Italian, 3; Drawing, 1; and Practical Work, 1.

The students if found fit for the Service are enrolled for a period of six years if they are seventeen years of age or over on leaving the school, or for six years from the age of seventeen if below that age. They do not pay anything during their sojourn at the school, but are rated as 3rd class seamen on land. On completing the course, and passing the final examination, they are nominated 3rd class engineer (quartermasters) in the *Corpo Reale Equipaggi*, and embark on an armed cruiser for a probationary period of not less than two months or more than six, in order to test their suitability for the sea. If approved at the end of this cruise they are confirmed in their appointment; but if not approved, they undergo a second test of six months at most; and if again not approved, special steps are taken with regard to them as may be deemed best from their talents, the circumstances of the case, or the needs of the Service.

Higher Course for Student Commissaries.—This takes place annually near the three Maritime Departments, with the object of preparing young commissariat Officers for the naval administrative service. The instructor is a superior administrative Officer.

Artillery School.—Established on a ship in the harbour of Spezia, for the training of gunners and master gunners.

Torpedo School.—Also at Spezia, for the instruction of torpedo detachments.

School of Telegraphy.—Also at Spezia.

Training School on board ship, to prepare boys for the sea. Boys are admitted between sixteen and seventeen; the course lasts one year, at the end of which the boys are enrolled as 3rd class seamen in the *Corpo Reale Equipaggi*.

School for Apprentices in the arsenals, to furnish to the Artillery and Torpedo School-ships a certain number of students instructed in mechanics, and to train youths as military artificers. The course is divided into four classes.

The Higher Naval School at Genoa is maintained by the province, the Commune, and the Chamber of Commerce with the sanction of the State, and its object is to train naval engineers and mechanics; Instructors in nautical astronomy, navigation, hydrography, physical geography, meteorology, naval construction, and machines and steam power; hydrographical engineers; and to complete the theoretical and practical instruction of naval machinists.

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Friday, May 13, 1892.

MAJOR-GENERAL R. N. DAWSON-SCOTT, Commandant, School of
Military Engineering, Chatham, Member of Council, in the Chair.

MODERN AERIAL NAVIGATION.

By Captain J. D. FULLERTON, R.E.

SYLLABUS.

Introductory remarks and division of the subject.

SECTION I.—*Ballooning or Aerial Navigation by means of Machines lighter than the Air.*

Characteristics of this system.—Successful attempts at propelling balloons.—Giffard's dirigible balloon.—Dupuy de Lôme's dirigible balloon.—The dirigible balloon designed by the brothers Tissaudier.—"La France."—Campbell's air ship.—Professor Carl Meyer's aerial bicycle.—Proposed balloon for war purposes.—The method of calculating the power, speed, &c., of dirigible balloons.—General remarks on dirigible balloons.

SECTION II.—*Aviation or Aerial Navigation by means of Machines heavier than the Air.*

Characteristics of this system.—The theory of aeroplanes.—The motion of an aeroplane through the air.—Longitudinal stability.—Crosswise stability.—Remarks on large aeroplanes.—The bird, and theories of its flight.—Wing motion.—Movements during flight.—Power, speed, &c., of a bird in motion.—Mons. Marey's views.—Mr. Chanute's views.—Mons. Richet's views.—Possibilities of flight in man.—Successful flying machines.—Hargraves model.—Mons. Adler's machine.—Machine proposed by Mr. Maxim.—Motors and methods of propulsion.—The method of calculating the speed, power, &c., of machines of the aeroplane type.—General remarks on aviation.

Concluding remarks.

Introductory Remarks.

THE subject which I propose to bring to your notice to-day, viz., "Aerial Navigation," is one of the very greatest importance to mankind in general, as there can be no possible doubt that if the power of moving safely and expeditiously through the air be successfully attained, great changes affecting all classes and all interests will take place.

Hitherto, unfortunately, in this country aerial navigation has been looked upon, to put it mildly, with the deepest suspicion, and it is no exaggeration to say that the terms "aeronaut" and "lunatic" are at present considered as more or less synonymous.

My object to-day is to show you that the science of aeronautics is based upon simple rules and common sense, and not upon wild and vague theories opposed to all principles of nature. It is only within the last few years that the subject has been scientifically studied, and I believe that, as the result of that study, the long wished for solution of the problem is at last within our reach.

What I particularly wish to do to-day is not so much to advocate any particular system of flight, as to explain the latest ideas on the subject, and to leave you to judge for yourselves as to their possible application for practical purposes.

Division of the Subject.

Aerial navigation is divided into two distinct branches, viz.:—

1. Ballooning, or navigation by means of machines lighter than air;
 2. Aviation, or navigation by means of machines heavier than air;
- and as these two branches depend upon different principles, I propose to explain them separately.

SECTION I. BALLOONING, OR AERIAL NAVIGATION BY MEANS OF MACHINES LIGHTER THAN THE AIR.

Characteristics of this System.

The chief characteristics of this system are:—

1. That the weight to be moved is floated in the air, by means of a balloon or envelope, filled with a gas lighter than the air—the principle being, of course, exactly the same as that by which a ship floats on the water.
2. That the forms of the balloon, car, &c., are such as to offer the smallest possible resistance. For this reason the envelope is usually made spindle-shaped.
3. That owing to the weight being taken, as above explained, it is only necessary to provide a propulsive force sufficient to overcome the horizontal resistance.

Fig. 8 shows an ordinary type of dirigible balloon. It will be seen

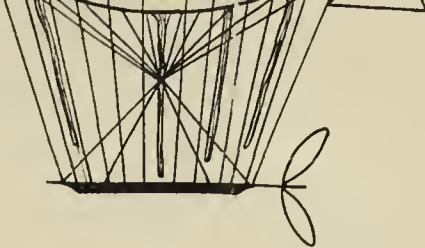
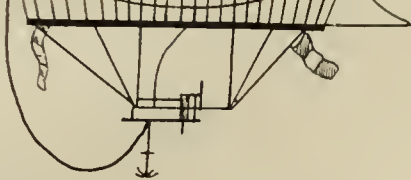


FIG. 6. CAMPBELL'S AIR SHIP.
FROM "SCIENTIFIC AMERICAN."

FIG. 7. PROFESSOR C. MEYER'S AERIAL B

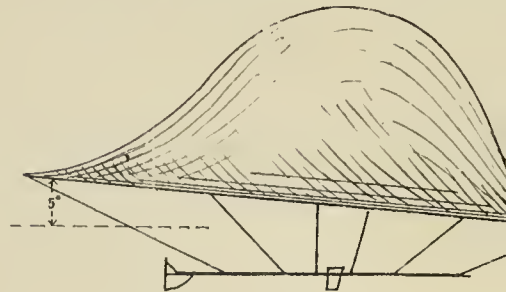
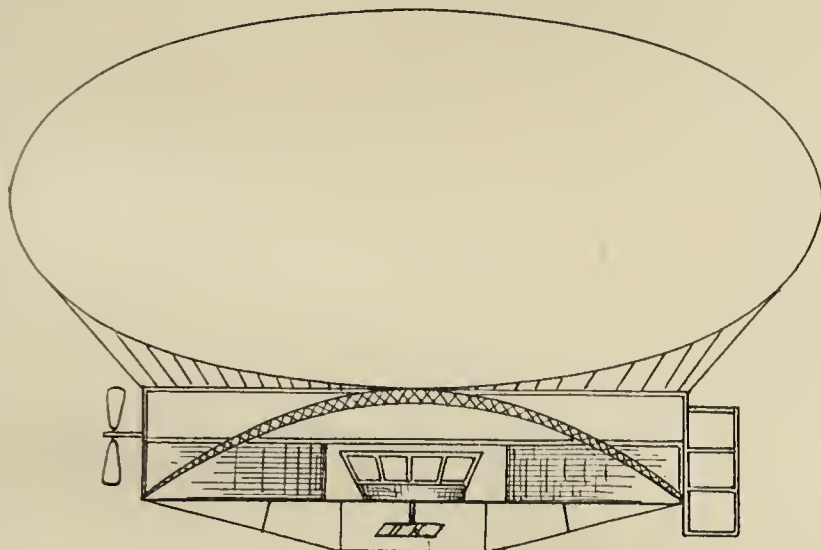


FIG. 11. THEORY OF BIRD MOTION.

FIG. 16. DIAGRAM OF GULL'S MOVEMENTS.

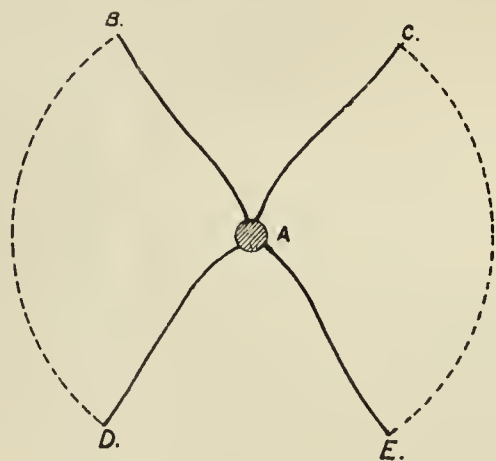
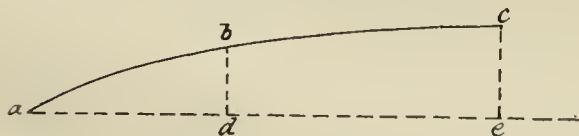
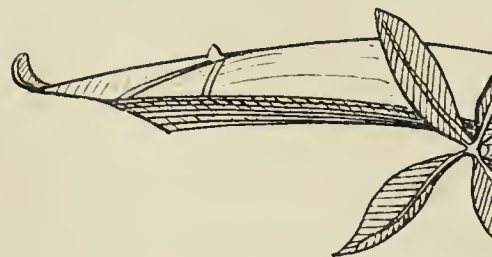
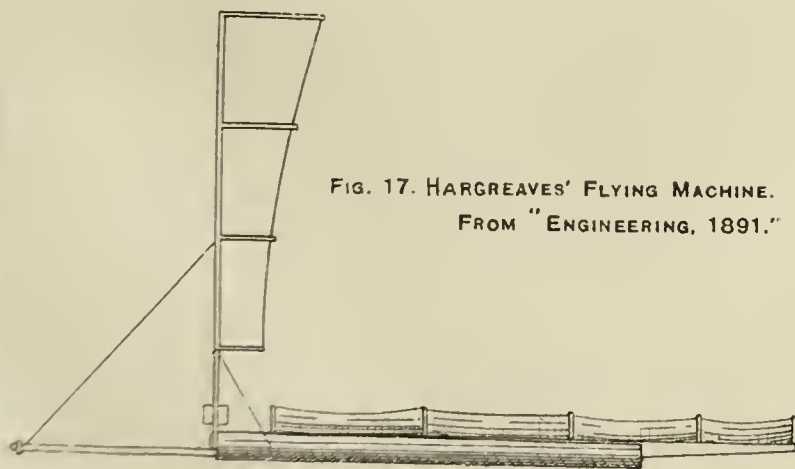


FIG. 18. ADER'S FLYING MACHINE.
FROM "RAILWAY AND MARINE ENGINEERING."

FIG. 17. HARGREAVES' FLYING MACHINE.
FROM "ENGINEERING, 1891."



FIGS. 1, 2, 3, AND 4 FROM "LA NAVIGATION AERIENNE," BY TISSAUDIER.

FIG. 1. GIFFARD'S BALLOON.

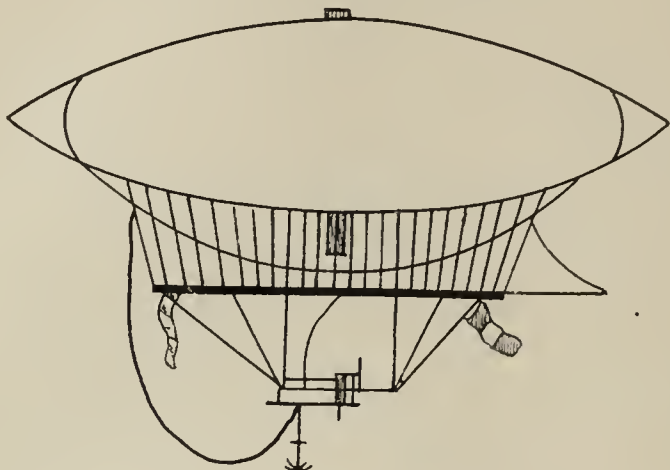


FIG. 2. BALLOON OF 1

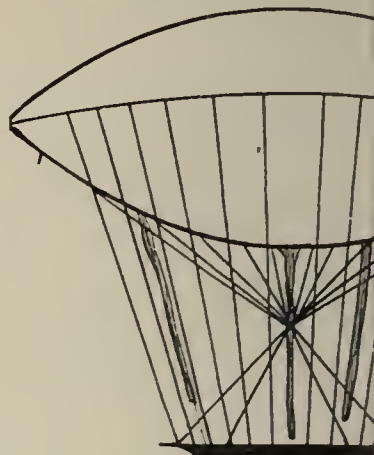


FIG. 6. CAMPBELL'S AIR SHIP.
FROM "SCIENTIFIC AMERICAN."

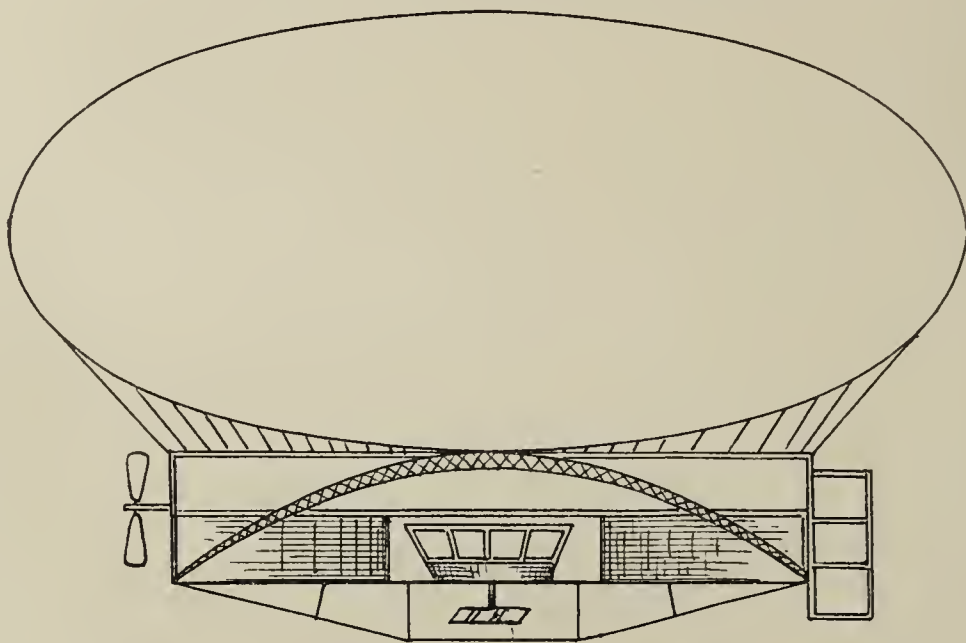


FIG. 7. P

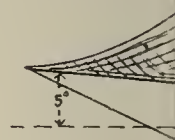


Fig. 11.

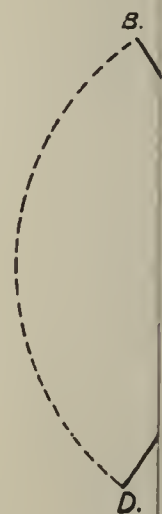


FIG. 16. DIAGRAM OF GULL'S MOVEMENTS.

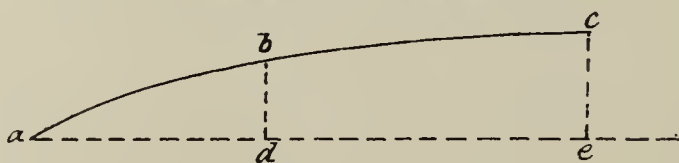
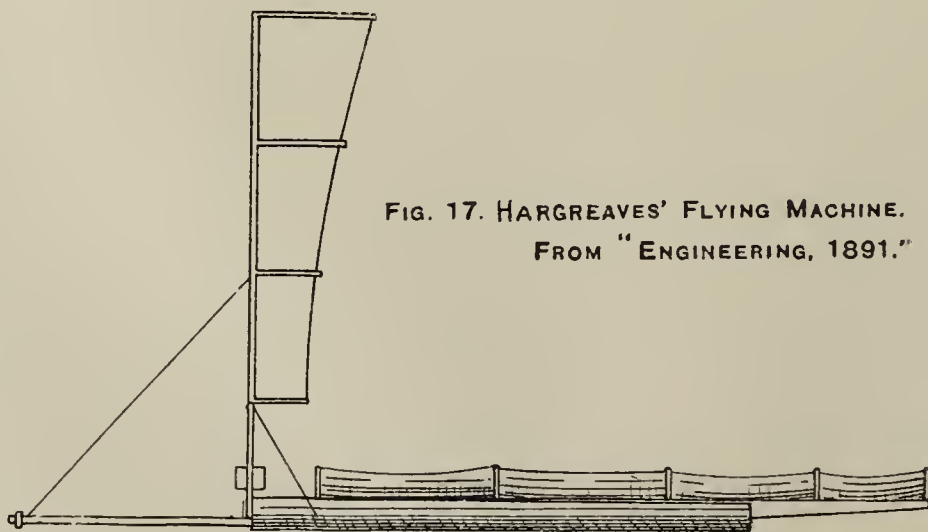


FIG. 17. HARGREAVES' FLYING MACHINE.
FROM "ENGINEERING, 1891."



that the envelope is spindle-shaped, and that the car is attached to it by means of a specially-designed jacket with rope attachments, &c.

Successful Attempts at Propelling Balloons.

From time to time various persons have constructed small model balloons, and worked them successfully at a slow pace.

In 1833 Rufus Porter, an American, constructed a model 22 feet long, and 4 feet in diameter. The propulsive power was a compact little steam engine, and it appears that the machine actually moved at a somewhat rapid rate when exhibited at New York and Washington. In 1850 Mons. Jullien exhibited a model at the Hippodrome in Paris; it was fish-shaped, and weighed 1,160 grams, the content of the envelope being 1,203 c.dm. The gas employed was pure hydrogen, and the machine was forced along by a spring working two small screws. It appears to have been fairly successful, but eventually broke down from being overweighted. The first really successful attempt, however, on a large scale, appears to have been that of Mons. Henri Giffard, shown in Fig. 1.

Giffard's Balloon.

The principal dimensions were; length 44 m., largest diameter 12 m., cubic content 2,500 c.m., giving for pure hydrogen a lifting power of 2,800 kilos., and for coal-gas (which was actually used) 1,800 kilos. There was a long wooden bar, 20 m. in length, to which the car and its appurtenances was hung 6 m. lower down. The car itself was little more than a wooden platform with wheels, so as to allow of the machine running easily along the ground, if it came down with any horizontal velocity. The boiler was vertical, and surrounded with a sheet-iron casing to prevent any flame reaching the coal-gas. The funnel pointed downwards, and the whole apparatus was very ingeniously designed.

The screw had 3 blades and a diameter of 3.40 m.; with 110 revolutions it gave 3 F.H.P. The weights were as follows:—envelope with valve, 320 kilos.; net, 150 kilos.; beam, suspending ropes, &c., 300 kilos.; machine and boiler empty, 150 kilos.; water and coke in boiler at time of starting, 60 kilos.; car with wheels, coal and water tanks, 420 kilos.; anchor rope, 80 kilos.; one passenger, 70 kilos.; spare, 258 kilos.; total, 1,800 kilos. The ascensional force was 10 kilos., the remainder of the spare 258 kilos. being utilized for coal and water.

A trial was made on the 24th September, 1852; there was a strong wind blowing at the time, and although the machine could not overcome the wind resistance, it managed to keep fairly well up to it, and there was no difficulty in steering in any direction. To Mons. Giffard undoubtedly belongs the credit of having been the first person to manœuvre a balloon in the air, with any sort of success.

The next successful attempt was that of

Dupuy de Lôme.

This balloon is shown in Fig. 2. During the siege of Paris in October, 1870, the Government of National Defence entrusted the construction of a dirigible balloon to Mons. Dupuy de Lôme, but unfortunately it was not completed until the siege was over. The principal dimensions were: length, 36 m.; largest diameter, 14.84 m.; cubic content, 3,400 c.m.; screw, 9 m. in diameter. Pure hydrogen was used for inflating the envelope; the motive power was furnished by eight men. There was a very ingenious arrangement for causing the balloon to rise or fall, and for keeping the envelope to its proper form, in the shape of a small balloon inside the large one. This small balloon was filled with atmospheric air, and had a capacity of about $\frac{1}{10}$ th of the large one. To raise the machine, air was drawn out of this balloon, thus making the whole affair lighter, while to lower it, air was forced in. In this manner a rising power of 864 m. was obtained. Another point about the balloon was the manner in which the car was hung; all the suspending ropes were collected at a point above the car, the idea being to render the machine more stable, and to stop swaying about.

A trial took place on 2nd February, 1872, and was successful, speed of about 2.82 m. per second, or $10\frac{1}{4}$ km. per hour, having been attained, on a still day, with $27\frac{1}{2}$ revolutions per minute of the screw. It was of course obvious that man power was not sufficient for practical work, and Mons. de Lôme proposed using an 8 F.H.P. engine, but the French Government does not appear to have done anything further in the matter.

The Balloons designed by the Brothers Tissaudier.

At the Paris Exhibition of 1881, the brothers Tissaudier showed a small dirigible balloon, of a type very similar to that of Giffard's. This balloon had a small electric motor and attained a speed of 3 m. per second. Encouraged by these results, they constructed a large balloon shown in Fig. 3, the principal dimensions of which were length, 28 m.; largest diameter, 9.20 m.; cubic content, 1,060 c.m. There was an automatic valve in the lower part of the envelope. The screw had two blades, diameter 2.80 m., and made 180 to 200 revolutions per minute. The motor was a Siemens' dynamo, having a force of 100 kilogram-meters, and a weight of 45 kilos.; the battery being a bichromate one of special construction. The weights were: envelope with valve, 170 kilos.; jacket, rudder, suspending cords, 70 kilos.; braces, 34 kilos.; car (made of bamboo and wickerwork) 100 kilos.; motor screw and battery with materials for $2\frac{1}{2}$ hours' consumption 280 kilos.; anchor and guide rope, 50 kilos.; two passengers with instruments, 150 kilos.; ballast and spare, 396 kilos.; total lift 1,250 kilos. The balloon was inflated with hydrogen. Ascents were made in 1883 and 1884, with very fair success; there was no difficulty in steering, but the highest speed attained did not probably exceed

4 m. per second. With such a small H.P., viz., $1\frac{1}{2}$ F.H.P., this was not surprising. Want of funds seems to have prevented the brothers Tissaudier from doing any further work in the ballooning line.

“La France.”

Fig. 4 shows “La France,” the large dirigible balloon built by the French Military Engineers Captains Renaud and Krebs at Chalais-Meudon. The principal dimensions were: length, 50·42 m.; diameter, 8·40 m.; content, 1,864 c.m. The largest diameter was at a point about $\frac{1}{5}$ length from the front of the balloon, instead of being at the centre. The screw, which had a diameter of 7 m. (see Fig. 5), was placed in front, and the 12 F.H.P. engine gave a force of $8\frac{1}{2}$ F.H.P. on the shaft of the screw. There was a small balloon inside the envelope, as in Dupuy de Lôme’s machine, and a movable weight was used for adjusting the equilibrium of the whole apparatus. The car was 33 m. long, and 2 m. high; the object of the great length being to ensure stability. The weights were as follows:—Envelope and small balloon, 369 kilos.; jacket and net, 127 kilos.; car complete, 452 kilos.; rudder, 46 kilos.; screw, 41 kilos.; motor, 98 kilos.; other gear, 47 kilos.; shaft of motor, 30·5 kilos.; battery, &c., 435·5 kilos.; passengers, 140 kilos.; ballast, 214 kilos.; total, 2,000 kilos.

Ascents were made in 1884 and 1885 as follows:—

9th August, 1884.—Speed 4·58 m. per second; 42 revolutions of screw per minute. The balloon returned safely to Chalais-Meudon.

12th September, 1884.—Speed 4·43 m. per second; 50 revolutions. On this occasion there was a breakdown of the battery, and the descent was made at Velizy.

8th November, 1884.—Speed 6·00 m. per second; 55 revolutions. The balloon returned safely to Chalais-Meudon.

8th November, 1884.—Speed 3·82 m. per second; 35 revolutions.

25th August, 1885.—Speed 6·00 m. per second; 55 revolutions. Wind was too strong; descent at Villacoublay.

22nd September, 1885.—Speed 6·00 m. per second; 55 revolutions. The balloon returned safely to Chalais.

23rd September, 1885.—Speed 6·22 m. per second; 57 revolutions. The balloon returned safely to Chalais.

The general results were fairly successful, but no great speed could be obtained.

Captain Renaud states that the resistance to horizontal motion was much more than he had calculated, it having reached 22·8 kilos. for a speed of 5·50 m. per second. There was no difficulty in steering the machine; but on the first trial it pitched slightly; there does not appear to have been any difficulty about this afterwards. The speeds given above are, of course, for calm weather only.

Campbell's Air Ship.

In 1889, Mr. Campbell, an American, invented the air ship shown in Fig. 6. The length of the balloon was 60 feet, and, although spindle-shaped, the points were blunted. The rising and falling of the machine was managed by the vertical screw in the centre, there being not quite sufficient gas to lift the weight. One man could work both the vertical and horizontal propellers. The preliminary trials were successful, the machine moving forward at a slow pace; but on 16th July, 1889, when Professor Hogan went up in it, the vertical screw fell off, and entirely disarranged the equilibrium. This, of course, ruined the machine, which drifted out to sea and was never heard of again. The principle of the machine was good enough, but it could never have gone any pace, as the shape was bad and the power insufficient to drive it.

Professor C. Meyer's Aerial Bicycle.

The rather extraordinary looking machine represented in Fig. 7 is the aerial bicycle designed by Professor Carl Meyer. The figure is only a rough sketch, but will show the general principle of the apparatus. A short account of it appears in *Fores' "Sporting Magazine,"* 1890 and 1891, and the *"Graphic"* had a picture of it in August last.

The envelope is something in the shape of a cocked hat, the lower part of which is inclined at an angle of about 5° with the horizon. The propeller is rather a peculiar one, with a right and left, instead of a circular motion. The whole machine is made very light, the bicycle framework weighing, I believe, only 29 lbs.

The mode of starting is as follows:—The amount of gas in the envelope not being quite sufficient to raise the weight, the rider gets on the seat, and pushes himself up into the air, by pressing against the ground with his foot; he then works the pedals as hard as he can, and the machine moves upwards and forwards.

The explanation given in the article above quoted is that the back pressure of air from the propeller strikes the under surface of the balloon and forces it up. This, in my opinion, is incorrect; what I think really happens is that the under surface of the envelope acts as an aeroplane, and the moment any speed is got up the air furnishes a pressure, which forces the machine up. If this is the case, it is a most ingeniously designed apparatus. The steering is done by throwing the weight of the body to the left or right, something after the fashion of a bird. I will explain further on the theory of the action of an aeroplane.

It is of course very difficult, without having the exact dimensions, to calculate the power required to drive this machine; but from rough calculations I have made, I think the resistance for a speed of about 10 miles per hour would be about 3 lbs. A two-bladed screw propeller about 3 feet in diameter would give this thrust, if the power was about $\frac{1}{10}$ H.P. Such a force is just about what a man can

conveniently exert for several hours consecutively ; for shorter periods he can, of course, do much more.

The upward pressure on the aeroplane would be about 3 lbs., quite sufficient for the purpose. As far as I can see, there is no reason why the machine should not work. Professor Meyer says he can go 10 miles an hour, without undue exertion.

I think a less eccentric form of envelope would be better ; if it was spindle-shaped, and had a light aeroplane of bamboo and canvas over the head of the rider, the apparatus would probably be more manageable.

The next subject to be considered is the type of dirigible balloon likely to be suitable for war purposes.

Description of proposed War Balloon.

The requirements of such a balloon are :—

1. That it should be able to carry three or four passengers, a supply of explosive shells, and a machine gun or two.

2. That it should be able to travel at the rate of about 30 miles an hour on a still day ; this speed would enable it to keep up with almost any war-ship now afloat, on more than half the days of the year.

Fig. 8 shows a balloon which would, I think, meet the above requirements.

The Envelope.—Spindle-shaped, 30 feet in largest diameter ; length, 240 feet. General shape, a trachoid of revolution, the object being to get easy “entrance curves.” The valves for letting out gas should be so arranged as to be easily opened and shut from the car.

Jacket and Netting.—This should be light, but strong, and should be very carefully designed, as the stability of the balloon depends very much upon it.

Car.—Length, 120 feet ; breadth and height, 6 feet ; ends pointed so as to offer less resistance.

Propeller.—Two screws 18 feet in diameter.

Engines.—These would have to be very carefully designed, great attention being paid to lightness.

Rudder.—This should be a small screw in rear, above the propellers. It should be so arranged that its shaft can be moved from left to right. The thrust of the screw can thus be utilized to change the direction of the balloon.

Equilibrium Adjuster.—An arrangement similar to that used by Captains Renaud and Krebs in “La France” might be used with advantage.

Ballast.—Instead of using sand, air might be compressed in a tank. When it is required to ascend, air could be let out ; while in descending, air could be pumped in.

The Method of Calculating the Dimensions, Speed, &c.

In the “Proceedings of the Institute of Civil Engineers,” vols. lxxvii and lxxxix, are two papers on “Aerial Navigation,” by W. Pole, Esq.,

F.R.S., M.I.C.E. These are most important, as they are, as far as I can ascertain, the first attempt to calculate the speed, &c., upon really scientific principles. The whole theory of the subject is most carefully gone into, and I strongly recommend their perusal to anyone interested in the matter.

As regards the balloon shown in Fig. 8, I have worked out a set of formulæ, based, more or less, on Pole's paper, suited to the particular shape I advocate, and an account of them can be found in the "R.E. Journal" for February, 1891. The example calculated is as follows (see Fig. 8):—

Conditions.

Total weight, 5,400 lbs., approximately; general form as shown in the figure. Required the dimensions of the balloon, its speed, H.P., &c.

(a.) Assuming a diameter of 30 feet, and length 240 feet, the weight which the balloon can lift is found to be 5,437·26 lbs. This might be distributed as follows:—

	Lbs.
Envelope.....	700
Jacket and netting.....	300
Car, lines, rudder, &c.	600
Propeller and screw	200
Engines, water, fuel, &c.	1,800
Instruments	100
Anchor, spare ropes, &c.	150
Passengers	500
Explosives, ballast, &c.	1,087
	<hr/> 5,437

(b.) The cubic content is 72,403 cubic feet.

(c.) The maximum theoretical height to which the balloon can rise = 5,425·47 feet.

(d.) The resistance to motion through the air is = 230 lbs. at 26·927 miles per hour.

(e.) The gross horse power required would be 20 H.P.; efficiency taken at 0·8.

(f.) The speed would be 26·9 miles per hour.

(g.) The weight of the engines would be about 90 lbs. per H.P. with four hours' coal and water. I will allude to the subject of weight of engines further on; at present I will only say that there should be no difficulty in building engines at this weight.

Remarks on Dirigible Balloons.

The above calculations give rather startling results, but I believe they give a very fair statement of the case as it now stands. I will, however, leave you to draw your own conclusions, and merely point out some of the advantages and disadvantages of balloons, from a

mechanical point of view, it being, I think, generally admitted that for military purposes a balloon capable of moving safely and expeditiously through the air would be most useful.

Advantages.

1. Ascending and descending can be very easily managed by letting out ballast in the shape of compressed air. This air can be obtained at any height without difficulty.

2. No lifting power is required from the engines, only a propelling power; consequently very much less powerful and less expensive engines can be used. This is, of course, a very important matter.

Disadvantages.

1. Floating about in the air, entirely dependent on a bag of gas, is not a very safe proceeding.

2. It is doubtful whether, at very high speeds, the form of the balloon would not be altered, and consequently pace lost, owing to the pressure of the air. I think, however, that at speeds like 30 or 40 miles per hour this might be obviated, either by using a small balloon inside the large one, as before explained, or by making use of bamboo stiffeners, as proposed by General Hutchinson.

3. The difficulty of getting sufficiently light motors. This, of course, applies to all methods of aerial navigation.

4. The expense. This no doubt would be fairly heavy, but it must be recollected that a war balloon of the above type, if it was at all successful, would save its cost over and over again.

With these remarks I shall conclude the consideration of aerial navigation by means of machines lighter than air, and proceed to discuss "aviation," which I myself believe to be the most important of the two branches of the subject.

SECTION II.—AVIATION, OR NAVIGATION BY MEANS OF MACHINES HEAVIER THAN THE AIR.

Characteristics of this System.

The chief characteristics of this system are:—

1. That the machine used is heavier than the air.
2. That a large supporting surface, either in the form of wings, or in the form of an aeroplane, is used to carry the weight.
3. That the lifting or supporting power of this surface is dependent upon its velocity and the angle of inclination which it makes with the horizon, increasing as the velocity or angle increases, and decreasing as they decrease.
4. That the horizontal resistance to motion depends upon the velocity and angle of inclination, in the same manner as the lifting power does.

From these 3rd and 4th characteristics, the following very impor-

tant fact is deduced, viz.: that the higher the speed, the less the power required to drive the machine. For, by reducing the angle of inclination, the horizontal resistance and, consequently, the power is reduced, while, by using a high speed, loss of lifting power is compensated for.

Thus, a plane and car, weighing, say, 15,000 lbs., with a 4° inclination, moving at about 62 miles per hour, has to overcome a horizontal resistance = about 1,000 lbs. The same plane, with an inclination of 3° and a speed of 72 miles an hour, meets with a resistance = about 800 lbs. In other words, less power is required to drive it at 72 miles an hour than at 62 miles an hour. These figures are taken from the example worked out later on.

5. That the means of propulsion is either by wing movements, as in the case of a bird, or by a screw propeller, jet propulsion, or some such mechanical arrangement.

Before discussing possible flying machines of the aeroplane type, it is necessary to understand

The Theory of Aeroplanes.

Our knowledge of the principles governing the motion of a plane through the air has, till the last two years or so, been somewhat vague; the fact being that the subject has, until quite recently, received little or no attention. As regards planes moving vertically through the air, numerous experiments have been made by Hutton, Newton, and others, the general result being that, for small speeds, the pressure per square foot on a surface moved vertically through the air varies as some function of the square of the velocity. Different formulæ have been proposed, but for the purposes of this lecture I will take the well-known one of Smeaton, viz.,

$$p = \frac{v^2}{200},$$

where p = pressure per square foot in lbs., and v = velocity of plane in miles per hour.

Next, as regards planes moving through the air at an angle.

Various experiments have been made, but the first really satisfactory formula appears to be that of Colonel Duchemin, of the French Engineers, who found that

$$P_a = p \frac{2 \sin \alpha}{1 + \sin^2 \alpha},$$

where P_a = normal pressure per square foot on the inclined plane,

α = angle of inclination of the plane with the horizon.

During the last few years, Professor Langley, of America, has, by means of very carefully-constructed apparatus, thoroughly investigated the subject, and his results agree almost exactly with those of Duchemin. A very interesting account of these experiments is given

in "Experiments in Aerodynamics," recently published, and I think we may take it that the subject has now been fairly well threshed out. Assuming Langley and Duchemin's formulæ to be fairly correct, I will now explain

The Motion of an Aeroplane through the Air.

Let ab , Fig. 9, represent the aeroplane or thin rectangular plate, inclined to the horizon at an angle α , and moving with any given velocity, in the direction shown by the arrow. Then R is the normal resistance of the air $= SP_\alpha$, where S is the number of square feet of surface of the aeroplane.

Now R can be resolved into two components: $R \cos \alpha$ opposing the weight W , and $R \sin \alpha$ resisting the advance of the aeroplane. Leaving aside, for the moment, the fact that the forces R and W act at different points in the plane, we have:—

If $R \cos \alpha$ is less than W , the aeroplane will move downwards, with the velocity due to the pressure $W - R \cos \alpha$.

If $R \cos \alpha$ is greater than W , the aeroplane will move upwards, with the velocity due to the pressure $R \cos \alpha - W$.

If $R \cos \alpha = W$, the weight will be just supported and the aeroplane will move along, on the level, with the velocity corresponding to the value of R .

From the above it will be seen that it is easy to find out the weight which a given aeroplane, moving at a given velocity, will carry; for example, aeroplane 1 square foot, $\alpha = 2^\circ$, velocity 60 miles per hour. By Langley and Smeaton's formulæ, the normal pressure $R = 1.26$ lbs., and resolving

$$R \cos \alpha = 1.26 \text{ lbs. (since } \cos 2^\circ = 1 \text{ nearly);}$$

and, consequently, the plane will carry 1.26 lbs., including its own weight.

Also the resistance $R \sin \alpha = 0.043$ lb.; and, consequently, the horse power required to drive the plane $= \frac{0.043 \times 5,280}{33,000} = 0.00688$ H.P.

Longitudinal Stability.

I noticed above that the forces R and W were not applied at the same point. The reason of this is, that the centre of pressure of an inclined plane moving through a fluid does not coincide with the centre of gravity of the plane. The rules for finding the position of pressure in cases of this sort are given very clearly by Mons. Dezewiecki, in a paper read by him before the Aeronautical Society of Paris in 1889. This very important paper, to which I shall allude further on, states that, for planes of this description, moving at very small angles of inclination, the centre of pressure is at a distance from the front edge of the plane equal to two-tenths of its length. In the case above quoted, therefore, the distance between

the centres of pressure and gravity will be $\frac{3}{10} \times 12'' = 3.6''$, and must, of course, be taken into consideration. The best plan to do this appears to be, to shift the weights forward so that the vertical line through the centre of gravity coincides with the vertical line through the centre of pressure; in this way the machine will be longitudinally stable, and there will not be any tendency to tip back.

Crosswise Stability.

This is also important, and can be secured by making the plane in cross section somewhat as shown in Fig. 10.

Large Aeroplanes.

As regards large aeroplanes, such as those 50 feet by 100 feet in size, it cannot be said for certain that the pressures found by the above rules will be strictly in proportion to the extent of the surfaces, but they most probably are, and such will be considered to be the case in the calculations drawn up further on.

In the above remarks, I have only touched generally upon the more important parts of this subject. For further details, I must refer you to Professor Langley's "Experiments in Aerodynamics," and Monsieur Dezewiecki's paper, published in "L'Aéronaut," 1889.

I will now proceed to explain the motion of the best known flying machine at present, viz.:—

The Bird.

Up till quite recently, the generally accepted theory of the bird's motion has been that by flapping its wings it produced a force which lifted it and drove it along, somewhat as follows (Fig. 11):—

Let A be a cross section of the body of the bird, AB, AC, the position of the wings when at the beginning of the stroke; AD, AE, the positions at the end of the stroke; then it was considered that the wings acted as aeroplanes, moving with a velocity equal to that of the down stroke, the air pressures generated in this manner counterbalancing the weight, as soon as they were strong enough. It was admitted that the up strokes also produced air pressures, which would on this theory drive the birds down, but it was pointed out that there was a great difference between the strength of the upward and downward strokes, owing to the wing being in the former case convex, and in the latter concave. Speaking generally, it was the difference between the up and down air pressures which was the real motive power. The actual propulsion was supposed to be due to the fact that the forces above mentioned did not act in a vertical line, and that consequently there was a horizontal component which drove the bird along, and a vertical component which sustained it in the air.

This theory, however, does not appear to be correct. Mons. Dezewiecki's theory is as follows:—

1. A bird is simply an aeroplane of a peculiar shape, and having a peculiar kind of motor, and it is sustained in the air in exactly the same way as an aeroplane is.

2. A bird in full flight carries its plane, generally speaking, at an angle of about 2° or 3° .

3. The rules for aeroplanes apply generally to birds, making allowance for size of wings, &c.

4. At small angles, such as 2° , the resistance to horizontal motion (for small bodies) is very small indeed. The aeroplane alluded to above weighed about $1\frac{1}{4}$ lbs., and only required 0.006 H.P. to drive it at the rate of 60 miles an hour.

5. At the lower velocities, just after starting, owing to the steeper angle of inclination, greater power must be exerted by the bird, its object being to get up a high speed as quickly as possible, so as to utilize the air pressure as a lifting force.

6. The propelling force is due to the air escaping, or rather being forced under the wings backward. These streams of air act against the atmosphere, and propel the bird along.

I should add that Mons. Dezewiecki shows from an example that the usually accepted theory is quite wrong in the case of large birds, and that they cannot possibly work up sufficient air resistance to sustain their own weight.

Wing Motion.

There are probably few subjects which have been so much disputed over as the motion of a bird's wing in "rowing" or ordinary flight. The great difficulty in connection with the matter is to find out what really does occur, as the speeds of the birds and wings are so great that the eye does not readily grasp the motions. An immense amount of thought and labour has been spent by Mons. Marey, in making experiments on this subject, and in his most interesting book, called "*Le Vol des Oiseaux*," he has given us the results of these labours.

Fig. 12 shows the trajectory of the point of the wing of a buzzard in rowing flight (medium speed) and the approximate positions which the plane of the wing assumes during an up and down stroke. It will be noticed that the trajectory is elliptical, with the longer axis of the ellipse inclined downwards and forwards, and that in the second quarter of the ellipse the wing is distinctly driving the air backwards.

When a bird is in full flight, it is found, as might be expected, that the larger axis of the ellipse approaches more nearly to the vertical as the speed increases; while, on the other hand, at the commencement of flight, the axis is nearly horizontal.

Movements during Flight.

Our knowledge of the movements of birds during flight is by no means satisfactory, and many points in connection with the subject

are still much disputed. As regards "starting," it is pretty well certain that the smaller birds either give a vigorous jump in the air, so as to get clear of the ground, and then violently flap their wings, or throw themselves off a height, the object in both cases being the same, viz., to get up speed as quickly as possible, so as to get the benefit of the vertical component of the air pressure. Larger birds either throw themselves off a height, or run rapidly along the ground, jump into the air, and beat their wings violently.

"Stopping."—Fig. 13 shows a duck coming down. The method of using the wings, to prevent stopping too quickly, is well illustrated.

"Rowing Flight."—Fig. 14 shows the different positions of a gull, practising this kind of flight. Instantaneous photographs of their positions were taken by Mons. Marey, at intervals of $\frac{1}{50}$ th second.

"Floating Flight."—I do not know exactly what name to give this description of flight, but I think "floating" expresses the facts of the case. It is practised when a bird suddenly stops "rowing," and is carried forward by the impetus left in it. Usually, the bird glides down an inclined plane of about 7° or 8° , with his wings held out horizontal; as long as he has any energy left, he can, by altering the plane of his wings, rise, fall, move right or left, &c.

"Sailing Flight."—There is a great deal of difference of opinion as regards "Sailing Flight," but all authorities seem to agree upon one point, viz., that it can only be practised in a high wind. The usual idea seems to be that the vertical component of the high wind (against the bird) forms a supporting force to hold the bird in the air; later theories are against this, and it is difficult to say which is correct.

"Turning Movements."—This is done by throwing the weight of the body towards the side to which it is intended to turn.

The Power, Speed, &c., of a Bird in Flight.

Numerous attempts have been made to estimate the power required to move a bird at any given velocity, and the estimates are most conflicting. Years ago, one author considered that a goose in full flight expended 200 H.P., whilst a recent calculation by Mr. Maxim shows that the goose would only expend 0.083 H.P. When "doctors differ" to such an extent as this, it is a little difficult to get at the truth; but I think, by describing to you the methods used by some of the abler modern experimentalists, you can get a very fair idea of the approximate power required for the different kinds of flight.

Mons. Marey's System.

The first really careful, scientific calculations appear to be those of Mons. Marey, who was assisted by Captain de Labouret, of the French Engineers. In his book, "*Le Vol des Oiseaux*," he goes very thoroughly into the subject, and his general method of investigation may be described as follows:—

A gull, carrying a small bright bead on his head, was made to fly

in front of a specially-constructed camera, and photographs of the bird in flight were taken at intervals of $\frac{1}{50}$ th second. From the photographs the trajectory of the bead was made out. A very elaborate correction was made for the position of the centre of gravity of the bird, taking into account the differences of the position of this point, due to the up and down motion of the wings. From these data the true trajectory of the centre of gravity of the bird was calculated. Fig. 15 shows this line for a part of Example I in Mons. Marey's book; the gull was at the time flying slowly, viz., at the rate of about 15 miles per hour.

The method of calculating the forces exerted by the bird during each interval of $\frac{1}{50}$ th second, is best shown in Fig. 16.

Let a, b, c , be the trajectory of the centre of gravity of the bird, a, b , and c being the positions occupied by the bird at the 0·18-inch, 0·20-inch, and 0·22-inch respectively. Let ade be a horizontal line; then ad represents the horizontal space passed over between the 0·18-inch and the 0·20-inch, de the similar space between the 0·20-inch and the 0·22-inch, and so on. Similarly, bd and ce represent the vertical rise (or fall). Now, since $\frac{1}{50}$ -inch is a very short period, we may take

$$\text{force} = \text{acceleration per } \frac{1}{50}'' \times \text{mass of the bird};$$

consequently, if we know the trajectory, the forces can be calculated. As an example, let $ad = 103$ mm., $de = 119$ mm.; then

$$\text{acceleration per } \frac{1}{50}'' = 16 \text{ mm.}$$

$$\text{acceleration} = 0\cdot8 \text{ m. per second,}$$

$$\therefore \text{acceleration per } \frac{1}{50} \text{ in metres} = 40,$$

$$\text{and force} = 40 \times 0\cdot0637, \text{ when mass} = 0\cdot0637$$

$$= 2\cdot548.$$

The vertical forces can be found in a similar manner.

The estimation of the horse power, &c., has been very neatly worked out by Captain de Labouret from the forces, as calculated above, but, as the details are rather long, I must refer you to Mons. Marey's book for them. The general result, however, is—

$$\text{1st example, } \frac{7\cdot046}{75} = 0\cdot094 \text{ F.H.P.}$$

$$\text{2nd example, } \frac{7\cdot495}{75} = 0\cdot1 \text{ F.H.P. nearly,}$$

as the H.P. required to move the bird at the speed of about 15 miles an hour. For full flight Mons. Marey considers that about one-fifth of the above would be necessary

$$= 0\cdot02 \text{ F.H.P.}$$

Mr. Chanute's Method.

In the "Railroad and Engineering Journal" for February (and previous numbers), 1891, are some interesting articles on "Progress in Flying Machines," by Mr. Chanute. This gentleman considers a bird as an aeroplane, and calculates the power expended in the manner explained above for an aeroplane, making allowance for the concavity of the wings, &c. The two pigeons experimented on by him were of the following dimensions: largest cross section of body 4.9 square inches and 5.3 square inches; largest cross section of edge of wings 5.02 and 4.88 square inches; weight of birds 1 lb. and 0.969 lb.; total surface of spread wings, projected body, and spread tail, 132.56 square inches and 151.04 square inches.

Corrections have to be applied to all the above.

Cross Section of the Body.—As explained for balloons, the resistance of a fair-shaped body may be taken as $\frac{1}{20}$ of that of its cross section; consequently the area for body resistance may be considered = 0.05 square foot.

Area of the Wings.—This is about 1 square foot, and allowing for concavity, may be taken as 1.3 square foot.

Resistance of the Edge of the Wings.—This is equal to the area $\times 0.15$ as a reasonable coefficient.

Now to find the power required at various speeds; find by the usual aeroplane formula an angle which gives a lifting power approximately equal to the weight of the bird. The following examples show the power required at different speeds.

Speed, 20 miles per hour.

Normal resistance = 2 lbs.

Lifting power at $12^\circ = 1.3 \times 2 \times 0.39 = 1.014$ lbs.

Horizontal resistance at $12^\circ = 1.3 \times 2 \times 0.0828 = 378.7$ ft.-lbs.

Body resistance = $0.03472 \times 2 \times 0.05 = 6.1$ "

Edge of wings = $0.03472 \times 2 \times 0.15 = 18.3$ "

403.1 "

\therefore H.P. required = 0.0122 H.P.

For other speeds—

5° and 30 miles per hour 317.2 ft.-lbs.

3° and 40 " 394.2 "

2° and 50 " 556.5 "

$1\frac{1}{2}^\circ$ and 60 " 827.3 "

The reason why more power is required at 40 miles an hour than at 30 miles per hour is that the body resistance increases as the square of the velocity. This body resistance is a very important element in the case of a bird or small object, and has to be taken into consideration, especially in large flying machines.

According to Mr. Chanute, a bird usually carries its plane at an angle of about 3° , and this is the angle where the resistance is about minimum. He has added to the table of bird dimensions, &c., in Mons. Mouillard's "L'Empire de l'Air," a column showing the speed which each bird would fly at, supposing the angle of its plane to be 3° . The following are a few examples:—

Bat.....	15·9 miles per hour.
Swallow	23·1 ,,
Kingfisher.....	30·3 ,,
Rook	33·3 ,,
Quail	42·3 ,,
Gray pelican	51·3 ,,
Male duck	66·2 ,,

Mons. Richet's Views.

Mons. Richet, the editor of the "Revue Scientifique," endeavours to find the work done by a bird by the use of chemical formulæ, and the investigation is interesting as being an entirely different method of approaching the subject. It is based upon the following principles: a bird when in repose produces a certain amount of carbonic acid gas per kilogram of its weight per hour. Now if we can ascertain the amount produced when the bird is in motion, the difference will give us a basis from which to calculate the work done in flight.

Mons. Richet considers, from his own experiments and from those of other experimentalists, that a pigeon weighing 320 grams will produce 3·3 grams of carbonic acid gas per kilogram of its weight per hour, when in repose. Now we have no means of ascertaining exactly the amount that the bird will produce when in motion, but it seems probable that the increase will bear a similar ratio to that found by experiment to be the one for men and animals. This when a fair amount of exertion is being put out is about three times the amount when in repose. Assuming this to be correct, the bird would give out $3 \times 3\cdot3$ grams, say 10 grams per kilogram of its weight per hour when in full flight. Now deduct the amount given when in repose, and 6·6 grams is left as a basis for further calculations. By chemical experiment it has been found that 1 gram of carbonic acid gas is equivalent to 2·575 calories; consequently the 6·6 grams are equivalent to 17 calories. Now since the ratio of chemical to mechanical work is about 4 to 1, we may consider the mechanical work done as

$$= 4 \text{ calories} = 4 \times 423\cdot985 \text{ kilos.}$$

$$= 1,700 \text{ kilos. per hour.}$$

$$= \frac{1}{2} \text{ kilo. per second per kilo. of weight.}$$

This formula, if applied to the gull experimented on by Mons. Marey, would give about twice as much power required for full flight, but Mons. Richet states that $\frac{1}{2}$ kilogram is probably too high.

In concluding this part of the subject I may mention that Mons.

Tatin, in his paper in the "Revue Scientifique," makes the power very much lower, viz., about 0·0025 F.H.P. as a minimum and 0·015 F.H.P. as a maximum.

Possibilities of Flight in Man.

For centuries it has been the ambition of man to fly in the air with the speed of a bird, and the number of flying machines which have been invented is almost countless. I do not believe that it is possible for a man to fly by means of wings, without some assisting power. For suppose a large bird-shaped machine to be built, having a wing surface of 200 square feet, inclination of plane 2° . Now using the aeroplane formula, and considering the weight of the man to be 150 lbs., then for a speed of v miles per hour the

$$\text{lifting power} = 200 \times \frac{v^2}{200} \times 0\cdot07,$$

$$= 150 \text{ lbs.};$$

$$\therefore v = 46 \text{ miles per hour};$$

and the resistance would be

$$200 \times \frac{46^2}{200} \times 0\cdot0025 = 5\cdot3 \text{ lbs.},$$

$$\text{giving a H.P.} = 0\cdot65 \text{ E.H.P.}$$

Now in the above calculations no allowance has been made for the weight of the machine, or the body resistance of the man. Both of these would very largely increase the power required, and, as a man can only conveniently exert $\frac{1}{10}$ th H.P., it seems pretty certain that some extra power will be required to move him through the air.

Successful Flying Machines.

Up to the present (with the exception of Mons. Ader's machine) no full-sized apparatus has flown in the air. A good number of flying models have been constructed, such as the butterfly toy, de Pichancurt's bird, &c. One very good example is Mr. Hargraves' model shown in Fig. 17. The motor is compressed air stored in the tube which forms the backbone of the apparatus. The tube is 2 inches in diameter and $48\frac{1}{4}$ inches long; its weight being $19\frac{1}{2}$ ounces. The air pressure is 230 lbs. to the square inch. The engine weighs $6\frac{1}{3}$ ounces, its cylinder being $1\frac{1}{2}$ inches in diameter, stroke $1\frac{1}{4}$ inch. The piston rod is fastened to the tube, the cylinder working up and down, moving the wings. The wings are of paper and weigh 3 ozs.; their area is 216 square inches, and that of the body is 2,128 square inches. This model flew 368 feet on a calm day.

Ader's Flying Machine.

Fig. 18 shows Mons. Ader's flying machine. He is reported to have risen 60 feet in the air, and taken short flights of some 300 yards or 400 yards; but all details of the machinery are kept a secret. The real moving power is the screw in front, though I believe the wings are used to assist in rising from the ground.

Maxim's Flying Machine.

Constant mention is made in the public press of Mr. Maxim's flying machine. In the "Century Magazine" for October, 1891, he has written an article entitled "Aerial Navigation," the power required, describing the results of some of his experiments, and giving some information about the machine. It appears to be an aeroplane, with a car attached underneath; the supporting surface being about 5,500 square feet, and the angle of inclination 1 in 14, or $5^{\circ} 43'$. It is not quite clear from the article whether the angle can be varied, but presumably it can. The weight of the machine, engines, passengers, fuel, &c., is 5,000 lbs., and as he can carry 14,000 lbs., there is some 9,000 lbs. of weight to spare. The engines are extraordinarily light, weighing only about 13 lbs., and perhaps less, to the H.P. The push of the two screws is 1,000 lbs. when 120 H.P. is used; this would, with a $5^{\circ} 43'$ inclination, give a speed of about 45 miles per hour for motion on a level. The steam generator is self-regulating, has 48,000 brazen joints, and is heated by 45,000 gas jets, the gas being made from petroleum. Mr. Maxim is very sanguine as to its success. One doubtful point has been noticed by Mr. Brearey, in the "Proceedings of the Aeronautical Society," viz., that we do not at present know whether the rules for aeroplanes moving on a whirling table are strictly applicable to aeroplanes moving freely through the air. This is, of course, a very important point, but it can only be settled by making the experiment.

Motors and Methods of Propulsion.

The great difficulty, both in "Ballooning" and "Aviation" is to get a sufficiently light motor. At present, owing to the fact that such articles are not much in demand, 40 lbs. per H.P., is looked upon as a small weight; but there does not appear to be any reason why this should not be very largely reduced. Mr. Stringfellow's engine (1868) weighed only 13 lbs. per H.P., and an engine lately invented by the Rev. T. Jones comes to only about 14 lbs. per H.P. A description of this latter engine is given in General Hutchinson's "Navigable Balloons in War and Peace." Mr. Maxim's engine is probably a good deal lighter than either of the above, and, I believe, that when the matter is thoroughly gone into, it will be found possible to very largely reduce the present weights. I may add that as far as can be seen at present, a steam engine appears to be a more promising motor than an electrical one.

Next, as regards methods of propulsion, I do not think that any form of wing action is desirable, as the machinery for this kind of motion must be complicated, and will require very nice adjustment. At present a fine-pitched screw propeller, revolving at a rapid rate, appears to be the best, but probably in the future some form of jet propulsion will come into general use, as we cannot allow the enormous power given out by the explosion of gun-cotton or powder to be wasted for ever.

The Method of Calculating the Power Speed of Machines of the Aeroplane Type.

We have now to examine the general method of calculating the power, speed, &c., of a machine of the aeroplane type, and this will be best shown by an example.

Conditions.

Aeroplane.—110 ft. \times 50 ft. = 5,500 sq. ft. of surface; angle of inclination, variable at will.

Car.—About 70 ft. long, fair shaped, largest cross section. $7\frac{1}{2}$ ft. \times 10 ft.

Weights.—Aeroplane, car, &c., about 5,000 lbs., engines, fuel, &c., about 10,000 lbs.; 300 G.H.P., or about 33 lbs. per G.H.P.

Propelling Machinery.—Two two-bladed screws.

Method of Starting.—Either by running along a line of rails and rising in the air when the air pressure lifts the machine, or by holding the machine firmly to the ground, and allowing it to rise when there is sufficient air pressure to maintain it. Proper arrival and departure stations would have to be built.

Method of Descending.—Speed of descent to be checked by auxiliary planes, and suitable horizontal velocities to be chosen from the calculated tables, which will allow of the rate of fall being not greater than 22 ft. per second.

Calculations.

The general theory of aeroplanes has already been gone into. The calculations now required may be conveniently arranged as follows:—

1. Lifting power, and rising and falling velocities.
2. Horizontal resistances and the powers required to overcome them.
3. Convenient speeds, &c., and the power required.
4. The trajectory of the machine in the air under given conditions.

Lifting Power, &c.

(1.) From the aeroplane formulæ:—

$$\text{Lifting power} = 5,500 \cos \alpha \times \frac{v^2}{200} \times \frac{2 \sin \alpha}{1 + \sin^2 \alpha}.$$

Hence by assuming any convenient angle, and substituting values of v , such as 10 miles per hour, 20 miles, 30 miles, and so on, a table can be drawn up, as shown below, giving the lifting power for any given speed.

2. Rising and falling velocities. As already explained, the aeroplane will rise when

$$SR \cos \alpha > \text{the total weight,}$$

and it will fall when it is less. Let the rising or falling velocity = v' , then

$$v' = \sqrt{\left(\frac{\text{lifting power} \pm 15,000}{S}\right)} 200 \text{ miles per hour.}$$

It should be noticed, when considering these rising and falling movements, that the pressures are practically speaking those on a horizontal plane; for, when the angle of inclination of the aeroplane is very small, $R \cos \alpha = R = \text{weight}$.

The table below gives the lifting power and the rising and falling velocities for an angle of inclination of 3° .

TABLE I.

Velocity in miles per hour.	Lifting power.	Downward velocity.	Upward velocity.
	lbs.	ft. per sec.	ft. per sec.
0	0	34.24	0
10	286	33.88	..
20	1,144	32.85	..
30	2,574	31.09	..
40	4,576	28.45	..
50	7,150	24.79	..
60	10,296	19.21	..
70	14,014	7.48	..
80	18,304	..	16.13
90	23,166	..	23.61
100	28,600	..	32.70
110	34,606	..	39.16

N.B.—When the machine has a horizontal velocity of 72.3 miles per hour, it will just move along in *the air* on a level.

Horizontal Resistances and G.H.P.

(1.) The horizontal resistances to be overcome are—

- a. Air resistance to aeroplane.
- b. Air resistance to body of car, ropes, &c.
- c. Rail resistance while the machine is on the ground.

(a.) The air resistance to aeroplane is found

$$= 5,500 \sin \alpha \frac{v^2}{200} \times \frac{2 \sin \alpha}{1 + \sin^2 \alpha},$$

and can be tabulated in the same manner as the lift.

(b.) The body resistance may in this case be taken

$$= 75 \times \frac{1}{15} \times \frac{v^2}{200}.$$

(c.) Rail resistance. From Forney's "Catechism of the Locomotive" this is found to be—

Speeds.	Resistances per ton of 2,000 lbs.
10	6·6 lbs.
20	8·3 „
30	11·2 „
40	15·3 „
50	20·6 „
60	27·0 „
70	34·6 „

The following table shows all these resistances for the various speeds:—

TABLE II.

Velocity in miles per hour.	Resistance in lbs.					Gross horse power required to drive the machine through <i>the air.</i>
	Air.	Body.	Rail.	Total.		
				Without rail.	With rail.	
0	0	0	0	0	0	0
10	14·85	2·5	49·70	17·35	67·05	0·60
20	59·40	10	62·25	69·40	131·65	4·69
30	133·65	22·5	84·00	156·15	240·15	14·98
40	237·60	40	114·75	277·60	392·35	42·27
50	371·25	62	154·50	433·25	587·75	64·71
60	534·60	90	202·50	624·60	827·10	108·96
70	727·65	122	259·50	849·65	1,109·15	171·33
80	950·40	160	..	1,110·40	..	253·52
90	1,202·85	202	..	1,404·85	..	357·46
100	1,485·00	250	..	1,735·00	..	485·91
110	1,796·85	302	..	2,098·85	..	640·42

N.B.—The gross horse power required to drive the machine on a level through the air at 72·3 miles per hour = 189·75 G.H.P.

(2.) The G.H.P. required to overcome the resistances is—

$$= \frac{\text{Resistance in lbs.} \times \text{speed in ft. per minute}}{33,000}$$

To find the G.H.P., a percentage must be added for slip of the screw; the amount of this is not well known, but I have taken it as follows :—

Speed in miles per hour.	Percentage of slip.
10	30
20	24
30	20
40	16
50	12
60	9
70	8
80	7
90	6
100	5
110	4

Table II, above, shows the above calculated resistances and G.H.P.

Speed, Power, &c.

An inspection of the above tables for 3° inclination shows—

- 1. That the machine will move on a level in the air at a speed of 72·3 miles per hour.
- 2. That the G.H.P. required to so move it is 189·75 G.H.P.
- 3. That a convenient rising velocity is about 16·13 feet per second, and that this would be attained when the machine had a horizontal velocity of 80 miles per hour.
- 4. That a convenient descending velocity, leaving out of consideration auxiliary aeroplanes, would be 7·48 feet per second, which is attained when the horizontal velocity is 70 miles per hour. It must be understood that these results only apply to a 3° inclination; a lower inclination of the aeroplane would, of course, be much more favourable to rapid motion.

Trajectory of the Machine in the Air under given Conditions.

From the above tables we can work out the trajectory of the machine (see Fig. 19). Starting from A at 9 A.M. with a velocity of 80 miles per hour, in one minute the machine would be at B, 967·8 feet above the ground. C would be reached at 10 hours 1 minute, 72·3 miles having been covered in one hour. In coming down (leaving out of consideration the use of auxiliary planes), the falling velocity might be 7·48 feet per second, and the ground would be reached at 10 hours 3 minutes 9·4 seconds.

The above calculations are, of course, very general, simply to give you an idea of the method employed.

General Remarks on Aviation.

Apart from the military value of such machines, from the mechanical point of view, the advantages and disadvantages of this class of apparatus appear to be :—

Advantages.

1. Very high speeds, with small expenditure of force.

Disadvantages.

1. As regards any wing-motion machines, the difficulty of producing the wing motion satisfactorily.

2. Owing to the high speeds and enormous differences of pressure caused by very slight alterations in the inclination of the aeroplane, great skill and watchfulness will be required on the part of those responsible for the working of the apparatus.

3. The difficulty of getting a sufficiently light motor. This affects any form of flying machine more than it does a balloon, as a flying machine is entirely dependent on a high speed, to supply the lifting force.

4. The danger in coming down with a high horizontal velocity. This can, I think, be arranged for by using auxiliary planes, and thus increasing the lifting power. It will not then be necessary to maintain a high horizontal velocity, in order to get a convenient vertical speed.

5. The difficulty of keeping the aeroplane at any particular angle. Until a trial has been made, it is hard to say whether this difficulty really exists or not.

Concluding Remarks.

In concluding, I wish to specially bring to notice the following points :—

1. The very great importance of “aerial navigation” to this country. The success of aerial machines will enormously affect the position of the United Kingdom ; in fact, there is no country in the world which will be so much affected. A total change will have to be made in our defensive system ; the value of our Navy will be very much reduced, and the “silver streak,” of which we hear so constantly, will, for all practical purposes, disappear. An aerial navy of the very first class will be an absolute necessity, if we are to maintain our position as one of the leading Powers in the world.

2. The importance of making really careful and scientific experiments on the subject, so as to obtain thoroughly satisfactory data to work from.

Hitherto, the most absurd mistakes have been made about air-pres-
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sure, &c., simply because proper experiments were not carried out. For instance, it has for years been supposed that if a plane were projected horizontally with any velocity, however high, it would always reach the ground in the same time that it would do if it were let fall without any horizontal velocity at all. Professor Langley's experiments show that this is not the case, and that the time of fall is very largely increased by giving a high horizontal velocity.

I mention this case, because such a very simple matter as this, one of enormous importance to aerial navigation, has apparently only been discovered in 1891!

In conclusion, I will quote a remark said to have been made by Mr. Maxim, who is now constructing a flying machine of the aeroplane type:—

"If I can rise from the coast of France, sail through the air across the Channel, and drop half a ton of nitro-glycerine upon an English city, I can revolutionize the world. I believe I can do it if I live long enough. If I die, someone will come after me, who will be successful if I fail. . . . It can be done as sure as fate. I have spent 45,000 dollars already upon it, and I did not enter upon the work until I was convinced that the idea was practical."

LIST OF BOOKS, PAPERS, &c.

- "Proceedings of the Institute of Civil Engineers," vols. lxxvii and lxxxix.
 - "Navigable Balloons in War and Peace," by General Hutchinson.
 - "Aerial Navigation," 1891, Chanute.
 - "Railroad and Engineering Journal," 1891, 1892, "Progress in Flying Machines," by Chanute.
 - "Le Vol des Oiseaux," by M. Marey.
 - "L'Aéronaute."
 - "Revue de l'Aéronautique."
 - "Scientific American," and Supplement.
 - "La Navigation Aérienne," by Tissaudier.
 - "L'Histoire des Ballons," by Tissaudier.
 - "The "Century Magazine," 1891.
 - "Experiments in Aerodynamics," by Langley.
 - "Fores' Sporting Magazine," 1890, 1891.
 - "L'Empire de l'Air."
 - "Revue Scientifique," &c., &c.
 - "Proceedings of the Aeronautical Society of Great Britain."
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Mr. GEORGE PHILLIPS, R.E.: With your kind approval I should like to make some remarks upon this most important subject of Aerial Navigation. I agree with the lecturer that in this country aeronauts, or, more properly speaking, people who profess to have discovered *the* way of navigating the air, are looked upon as a species of harmless lunatic. The reason that this is the case will be apparent when I explain that with a few notable exceptions all these people are only theorists, and in this more than in any other science there seems to be no limit to the wild themes proposed by them. To give instances of the humbler inventors, I may mention that one ingenious gentleman, arguing that air does not give much hold to

a screw, proposed that a small tank containing water should be suspended under the balloon, and the screw made to revolve in it. Another ingenious inventor at the Aeronautical Congress in Paris proposed a system of propulsion, in which a long lever with a weight at the end was raised by clockwork; when it arrived at the horizontal position it was suddenly released and fell vertically. He hoped that the successive jerks thus given would propel a balloon. More discredit, however, is brought on the subject by those who have scientific theoretical knowledge, without having the least idea of the practical difficulties which render their schemes unworkable. The lecturer would appear to have drawn too much on books and newspaper articles for the subject of this important lecture; and I am sorry to see that good, bad, and indifferent inventors have been placed side by side in such a way that it may lead to quite an erroneous impression as to the feasibility of aerial navigation. It is not right as it seems to me to compare true scientists like Giffard, Dupuy de Lôme, the brothers Tissaudier, Renard, and Krebs, with the schemes of Campbell and Mayer. The lecturer's own scheme for a navigable balloon with his curves formed by a trochoid of revolution is open to the practical difficulty that the extremities from their shape would be extremely difficult if not quite impossible to keep rigid. The means at our disposal for this are the interior air balloon as employed in France, and also the bar compressor of General Hutchinson, which latter, as far as I know, has never been practically tried. Easy entrance curves are not required for balloons or machines working in air, for air is a fluid having elasticity which water has not, and the resistance to forward motion is greatly dependent upon dealing effectually with skin friction. It may be interesting to note that a scientific Commission assembled by the French Government in 1888 to report upon the capabilities of navigable balloons arrived at the conclusion that, owing to the difficulty of keeping the envelope taut, and also on account of skin friction, navigable balloons could not be made to go at a speed exceeding 30 miles an hour. A steam engine has been proposed by the lecturer as being the best means of propelling balloons. The experiments carried out in France by those who are the greatest authorities on the subject, the Chalais-Meudon people, show that in the first instance they tried an electric motor (with which the experiments with "La France" were carried out), worked by primary batteries.¹ They then tried a petroleum motor which they shortly had to abandon. This has now been succeeded by another electric motor, but whether it is worked by primary or secondary batteries, I do not know; but the result obtained has been that 10 kilos. is the total weight per H.P., which allows of working for ten consecutive hours. The reason why a steam engine will not do, is the fact that the condensation of the water presents practical difficulties which are almost insurmountable. In 1887 Mr. Yon, the eminent aeronautical engineer in Paris, was entrusted by the Russian Government with the construction of a navigable balloon. This balloon, 66 metres in length, was to be driven by a petroleum engine of 50 H.P., and it was estimated that it would obtain a speed of 25 miles per hour. Everything went well except the condenser, and after trying every possible device, they failed to get it to work. Without a condenser, they lost 750 lbs. per hour simply through their water which destroyed in great measure the equilibrium of the balloon.² Of course I have not lost sight of Mr. Maxim's steam generator, which appears to be a very light and good motor, but then Mr. Maxim has to allow for fuel about 9 lbs. per H.P. per hour; which for ten hours makes 90 lbs. weight of fuel, and this does not compare favourably with the French electric motor. Respecting the experiments which have been carried out with machines heavier than air, there is no doubt that Mr. Hargraves, Mr. Maxim, and Professor Langley have carried out experiments which will prove of great value to us; but strange machines, like those of M. Ader, we only know of by newspaper reports, and we have no proof that they ever did go up. All

¹ These batteries, five to six times more powerful than bichromate batteries, have as poles platinized silver and zinc; the liquid consists of equal parts of hydrochloric acid and chromic acid.

² After this failure with the condenser, the Russian Government claimed the balloon as it was and took it to Russia. What they have since done with it is unknown.

we require for aerial navigation is a light and powerful motor ; that the French apparently have got, and if we could have it, there is no doubt that a reasonable sized navigable balloon could be made which would go up to 30 miles an hour. The great objection against navigable balloons has been their cumbersomeness. The machine of the future undoubtedly will be some form of a machine heavier than air. Experiments are being made, but whether they will succeed or not, we do not know. I hope Mr. Maxim will be successful, but there is no doubt he will have practical difficulties in the descent which may be excessively dangerous. A successful aerial machine heavier than air will require to be able to take its own weight from rest, and to come down vertically and gently.

Mr. J. STRINGFELLOW : I have very little to add to what Captain Fullerton has said, because he has treated this subject in a most masterly way. There are one or two minor points necessary to add to what is stated. One being that, between the latter end of the last century and the commencement of the present one, there were great efforts made towards aerial navigation. Of course, they had not the advantage of coal-gas ; they had to work with hydrogen ; but if we were to take the diagrams before us and to compare them with the diagrams of designs drawn out up to the year 1820, we should then find the whole of them already set out, and the mathematical calculations and researches made, connected with them. However, neither in what has formerly been designed or proposed, nor in any of the designs and proposals submitted to us by the lecturer, is there contained the essential requirements for practical aerial navigation. I believe there is no one who has gone into this matter so deeply as I have, and, as an engineer and a practical man, I claim to have solved the question of aerial locomotion. I am not prepared to say anything about it publicly, because I am waiting the opportunity to demonstrate to the world that an Englishman can master practical aerial locomotion the same as we have mastered land and water locomotion. I may say that having worked the whole of it through as to its principles, and without reference to any text-books, I find the principles underlying flight are the simplest mechanical laws that it is possible to conceive. Wing-power is the simplest form of non-resisting propeller for a given expenditure of energy. With regard to the wing-motion, the power derived from it is not so much the blow on the air, or the force exerted for lifting purposes, as it is that of a sinuous cleavage power. The fish in the water and the snake in the grass move by a similar law. Mr. Hiram Maxim, one of our best mechanical engineers, seeks to obtain combined levitation (that is, rising from the ground) and propulsion by a machine, or by mechanical force alone. It is self-evident that we cannot trust to such a means as that for practical aerial navigation, although of course it is perfectly practicable to so obtain rising and propelling power. But if we should adopt such a machine as could rise in the air, it being simply a machine, if any part of the mechanism went wrong, or the motive power were to stop, all control would be lost, and it must come down crash ; the same as a bird will if it is winged or loses its power of motion. It is imperative to have supporting or buoyant power as well as mechanical flight or propulsion. The simplest form of mechanical propeller is the wing, but the great difficulty in the adaptation of wings to aerial navigation has been the enormous leverage supposed to be required. For example, presuming a practical machine or aerial vessel was constructed, it would have to be something like 160 to 200 feet long ; the wings for that dimension necessarily being an enormous length would require an enormous leverage to work them ; but, in following it through, I found there was an easy way to get over that, and yet to retain practical efficiency. The other thing was with regard to guiding power. Amongst the 100 or so designs exhibited at the Aerial Exhibition held at the Alexandra Palace a few years ago, there was not one system or design that indicated the true method of guidance, that is, the method by which birds guide their flight. It took me six years to find out how the birds flew—that is the correct principles of bird flight, and it took me four years more to find out how they guided themselves. For aerial navigation there is required : 1st, displacement ; 2nd, motive power ; and 3rd, guidance ; and we have to assimilate these and bird flight to mechanical principles for a practical result. I built a machine entirely on those principles, an elongated balloon-shaped body for displacement, and worked it both with and without gas, and which, in motion and guidance, answered perfectly.

The CHAIRMAN: We would rather have a discussion on the paper than a vague account of what has been done in other places.

Mr. STRINGFELLOW: I will conclude by intimating that I shall be happy to place myself at the disposal of any of the Royal Engineers, to go into the matter with them privately.¹

Mr. BADEN-POWELL (Scots Guards): I perhaps might be allowed to say a word or two on the lecture, which has been very interesting and very exhaustive. There is nothing very much to add, but I should like to make one or two suggestions. First I see a picture of the screw of "La France." This screw is placed in front, and I understand that this was an ordinary shaped screw to draw the balloon, or rather the car, along. The lecturer has not referred to another balloon which was designed and, I believe, built and actually tried by a gentleman named Gower, who lectured in this Institution some years ago.² He placed a "flat screw" (if such a term can be applicable) in front of the horizontal axis of the balloon itself. This screw worked in such a way as to drive away air and so form a vacuum in front of the envelope, and so, as it were, suck the balloon along. This seems to me rather a good idea theoretically, because there is always a difficulty about the stiffness of a balloon, and if a vacuum is created just in front of it this stiffness is not then so necessary. I should also suggest that a framework inside the balloon seems a necessary thing. In propelling a gas bag along through the air it is always liable to be more or less flabby unless it is in some way pressed outwards. I should suggest a framework somewhat similar to that of an umbrella, which, I think, could be made very light. It is merely a matter of calculating what weight it would have to be; but some such light framework would keep the balloon stiff, and then it could be propelled with much greater ease than is the case with a flabby bag. Theorists very often assume that a balloon is an air-tight bag blown out quite tight, but I know in practice that this is by no means the case. There is always a certain amount of leakage, and temperature affects the gas so much that you would nearly always find that if the balloon was quite tight to start with a certain amount of gas would soon escape or contract from the coldness of the air, and this, it seems to me, would necessitate some stiffening. Of course, if the balloon had a framework inside it, it would have to have something like a small balloon inside connected with the outer air so as to allow for expansion and contraction. Temperature affects the lifting power of a balloon so greatly that I think it an absolute necessity to have some mode of making a balloon rise and fall without wasting gas or having to carry heavy ballast. I could give a practical instance. I remember being in a balloon when we were up at a height of 3,000 or 4,000 feet in sunshine. A cloud came over the sun, and the balloon, owing to the contraction of the gas, went straight down and landed us on the ground, and did not seem inclined to go up again, so without letting out any gas, a balloon can fall in that way, and have no lifting power when on the ground. That just shows how, in practice, you discover facts which you would hardly think were applicable in theory. Then, again, the lecturer divided the subject into two distinct portions: one as to navigating a vessel lighter than the air; and the second part dealing with apparatus heavier than the air. I do not see myself why these two should not be to some extent combined (as has been suggested several times before). Having an apparatus made, we will say, like an aeroplane, as generally designed, but having two skins: the interior might be blown out with gas, and in that way you might have a sort of flat-shaped balloon which would have a certain amount of lifting power, and in this way the apparatus may be greatly lightened. I do not say I should look upon that as really a practical apparatus for the future navigation of the air, but it seems to me something might be done in that way with an experimental machine. Of course the subject is a very difficult one to deal with, because inventors are jealous, and foreign nations, who are designing these balloons for military purposes, naturally keep their inventions very secret, so that the only accounts we get of all these are

¹ Mr. S. wishes it to be noted that he addressed himself more to the abstract question of accomplishing successful aerial navigation than to criticizing the paper read by Captain Fullerton.

² See Journal, No. 131, vol. xxix, 1885.

from the newspapers, and we know how often newspaper accounts are very inaccurate and misleading. It seems a pity in some way we cannot get at greater details, but, of course, we cannot expect it. If countries are at work in rivalry you cannot expect them to tell each other what they are doing. With regard to an aeroplane, what we want is to start the machine at a very rapid pace, and once it is going along in the air I should have thought it would not have required that speed to be kept up by mechanical propulsion. If we look at an albatross soaring in the air we know it somehow starts—we won't go into how it starts, because very few people have seen one start; but once well under way it has a certain amount of speed on it, and it goes along somehow managing to sustain itself in the air. If we have a machine which could be started by some very powerful engine, such, for instance, as compressed air, or some explosive so as to start it at a great rate, then I expect we should require a very much less amount of engine to merely propel it gently along after once it has got the start. However, it is, of course, very difficult to say how such theories will work in practice. It is a matter for more experiment, and I only hope we shall get more experiment.

Captain S. GORDON McDAKIN: After so much has been said, and very much to the purpose, on the subject of flight, I trust you will excuse the very few observations I shall attempt to make upon the subject. It does not appear to me (although perhaps my powers of apprehension may not have been sufficient to understand) how far the lecturer has intended to represent a flight of birds dealing with a succession of columns of air. In Diagram 15, where you may take the columns of figures as representing successive columns of air and flight of birds passing along, I think we could understand how when they came in succession over each column of air they would have to overcome the inertia of that column; whereas any screw device acting in a stationary manner pulls down the column of air, so that it is always grinding or churning, as it were, one column instead of passing in succession from column to column, and overcoming in succession the inertia of these several columns of air. It seems to me to be very much like the difference between grains of sand falling upon a lecture table and grains of sand passing through a tube 10 to 30 feet in length, when the effect is very different. The whole column of air above it is set in motion: the grains of sand coming down would, under these circumstances, perforate a slab of glass an inch in thickness, and even a slab of granite the same thickness. I do not think this principle has been recognized in dealing with flight, as it might have been by many who have touched upon the subject. The great difference between screw action and the action of wings of birds in flight is, that in flight the bird is encountering a succession of columns, and having to overcome their inertia glides along them, instead of simply acting in one place, as does a screw propulsion.

The CHAIRMAN (General Dawson-Scott): I feel myself rather an impostor in sitting in the chair on this occasion, because I have devoted no great attention to flying machines, or to dirigible balloons; but I happen to be Commandant of the School of Military Engineering, and in that position I am Captain Fullerton's Commanding Officer, so when he asked me to take the chair I felt great pleasure in doing so, more especially because his lecture is on a subject of great interest. We hear of German balloons on the Russian frontier sailing about, and apparently being under perfect control, and I suppose what the Germans can do we ought to be able to do. I have seen a good deal of military ballooning, and one of the gentlemen who has spoken upon the present occasion has been employed under me, and I know him to be a very good practical balloonist, as also we know Mr. Baden-Powell to be. They know the difficulties that have to be encountered, and have pointed some of them out. The diagrams before us seem very complicated. They show what has been done, and indicate what very large balloons or flying machines we must expect to have to deal with for either aviation or ballooning on a large scale. I am sorry the lecturer did not give Fig. 8 the same scale as Fig. 6. The latter, he told us, was 40 feet long, a balloon propelled through the air, and not an entire success, by one man. Fig. 8, which was proposed to be the war balloon of the future, is 240 feet long and 30 feet in diameter. That would be a troublesome thing either to make or to guide, or to manage in any way. I will allow the lecturer to contradict me afterwards, but I rather think that we are mistaken in

supposing that the war balloon of the future must of necessity be such a big machine. I do not think Mr. Maxim, who has been referred to as making some flying machines at the present time, and who we all know to be a very ingenious man, contemplates having such a large balloon, capable of carrying great weight, as is there portrayed. In fact, a gentleman remarked to me to-day that in some paper that Mr. Maxim had written at the end of last year he said he thought the war balloon of the future would be simply used, as the captive balloon is now, as a means of observation, in which case it would only have to take up one or two men to reconnoitre the enemy's troops and forces, and I think that the idea of dropping half a ton of dynamite on to an enemy's ship, or into an enemy's town, though it looks very formidable here, is rather outside of practical politics as far as we have got at present. I think the lecturer himself does not quite believe in it. I feel sure that if any of us really thought that any action of ours could upset our naval defensive system, or make the "silver streak" for practical purposes disappear, we should refuse to have anything to do with it. With these few remarks I will ask the lecturer to reply to the observations that have been made.

Captain FULLERTON: I have not much to say in reply. With regard to the shape of the proposed war balloon, it is difficult to show it properly; there should be more of a dip here, and it should be more of the shape called by naval architects "fair shaped." I think this form gives the least resistance to forward motion—a very important matter. The size of the balloon of course depends upon how much weight you want to take up. For reconnoitring balloons, perhaps two or three men are as many as are wanted, but you can hardly take less. Our spherical balloons without any engines or machinery, require a 10,000 cubic feet capacity for three men, and of course if you have machinery, &c., the lifting capacity must be increased. The reason why I choose Myers' aerial bicycle is, that this is a class of machine which can be easily made anywhere. It could not go very fast, but some 9 miles an hour might be got out of it without much difficulty. As regards the feasibility of dropping or firing shells downwards from a balloon, there does not seem to be much difficulty in the matter. No doubt it would be very pleasant for us if arrangements of this sort were not likely to be invented; but if other people are going to invent them, and use them against us (as they specially say they will), surely the best plan is to try and get ready to defeat their efforts.

The CHAIRMAN: It only remains for me to ask you to join me in giving a vote of thanks to Captain Fullerton for his lecture.

NOTES.

1. *Chalais-Meudon Experiments*.—The Chalais-Meudon people do not seem to have touched the subject of aeroplanes. The experiments of Professor Langley were most carefully carried out, the newest and best forms of recording instruments having been used, and they most certainly cannot be considered to be of "secondary importance," as Mr. Phillips suggests. I may point out here that in a comparatively new science like "aerial navigation" it is of the very greatest importance to look at the subject from different points of view, and, in doing this, books and newspapers are of the very greatest assistance.

2. *Shape of Balloon Bodies*.—I do not agree with the idea that "easy entrance curves are not required for machines working in the air." A "fair shape" is essential. It is impossible to drive any but "fair shaped" bodies through the air at a high rate of speed. As regards skin friction I agree with Mr. Maxim, who expressly states in his published account, as a result of his experiments, that there is very little or no skin friction. Mr. Langley's experiments apparently give the same result.

3. *Motors*.—Eventually an electric motor may be found to be the best, but Com. mandant Renaud stated, in "*L'Aéronautique*" (1889), that electricity was a failure, and would not be used in future. As regards steam, see note on Condensers.

4. *Condensers*.—I am not aware how the Chalais-Meudon people tried their condensers; but one would imagine that condensers moving through the air would

work rather better than those stationary on the ground. If the air is allowed to play freely upon the tubes, or surfaces, the condensing power must be largely increased. Most probably, in the case quoted by Mr. Phillips, this was not done.

Mr. Maxim puts his condenser in the aeroplane, and he states that it is very efficient.

5. *Coal and Water*.—9 lbs. per I.H.P. per hour is the usual amount allowed for the ordinary class of engine. Nobody, however, supposes that Mr. Maxim's is an ordinary engine. His own published statement shows about 1,000 lbs. of coal and water allowed for (I understand) a ten hour trip. If 9 lbs., as above, was allowed, the coal and water alone would weigh some 27,000 lbs., or nearly twice as much as the total weight of his machine, engines, baggage, &c.!!!

6. *Temperature as affecting Balloons*.—Of course there is always a certain amount of flabbiness about a balloon, but the ordinary rules of physics explain how the temperature affects the gas in it. I should imagine the case quoted by Mr. Baden-Powell was due to the fact that, owing to the sunshine, the gas expanded and some had to be let out of the balloon to prevent it straining the envelope. When the clouds came out the gas contracted, and there was not sufficient left at the lower temperature to keep the weight up in the air.

7. *Gower's Balloon*.—I cannot explain the principle used by Gower. It depends entirely upon the theory of the screw propeller; but at present this theory is more or less in the clouds. I think the general tendency of a screw worked in this manner would be to cause a great strain on the balloon.

8. *Combination of Ballooning and Aviation*.—There is, of course, no reason why the two systems should not be combined. I divided the subject simply because I think it is easier to understand it when its branches are considered separately.

9. *Flight of Birds*.—Fig. 15 is not intended to show a "flight" of birds, but the different positions of the gull's wings at intervals of $\frac{1}{50}$ sec.

10. *Use in War*.—Mr. Maxim says: "When the first flying machine succeeds, its first great use will be for military purposes. . . . It will at once become an engine of war, not only to reconnoitre the enemy's positions, as has been attempted with the so-called dirigible balloons, but also for carrying and dropping into the enemy's lines and country large bombs charged with high explosives."

J. D. F.

Wednesday, May 18, 1892.

ADMIRAL SIR R. VESEY HAMILTON, K.C.B., Member of
Council, in the Chair.

DISCUSSION ON THE SUBJECT OF THE NAVAL PRIZE
ESSAYS, viz. :—

“ Maritime supremacy being essential for the general protection of the British Empire and its commerce, to what extent, if any, should our Naval Force be supplemented by fixed defences at home and abroad, and to whom should they be confided ? ”

POINTS FOR DISCUSSION.

PRIZE ESSAY. (See Journal, p. 410.)

Author's General Conclusions.

1. That to the Navy should be entrusted the duty of sweeping the high seas and of keeping them clear of the enemy's cruisers.
2. That, after our maritime supremacy has been assured by building a sufficient number of ships, our naval force should be supplemented by certain fixed defences, raised to meet a definite purpose at our different ports at home and abroad ; this purpose being to resist a raid or attack by one or more cruisers for a few days, and to offer a safe refuge for our war-ships and mercantile marine while coaling, loading or unloading, or under repair.
3. That these fixed defences are of little use, since they could not keep the entrance of the port clear, or prevent the attack of torpedo-boats, without a floating defence consisting of torpedo-boats and armed local steamers acting as guard-boats.
4. That these fixed defences should be under military control, but that all the purely naval or maritime portion of the defences should be manned and worked by seamen under a naval Officer attached to the Staff of the General Officer in command.
5. To avoid, however, breaking up regiments into small detachments unnecessarily, certain small coaling stations abroad should be manned by marines and seamen and placed under naval control.
6. That the only way that our naval and military forces can be kept in their proper proportion, and used with the greatest effect, is to place them both under one Minister.

LIEUTENANT HYDE SMITH'S ESSAY. (See Journal, p. 445.)

Author's Summary of Conclusions.

- (i.) Even if the main fleet sustain a defeat, the state of the enemy will not be such as to undertake an organized territorial attack in the face of Reserve or Flanking Fleet ; consequently fortifications constructed to resist such an attack are unnecessary.

(ii.) Given an adequate naval defence, and proper organization of the land force as a *second line*, no enemy would risk attempting an invasion under cover of war-ships which had evaded our main fleets. That, therefore, fortifications to meet such a contingency are superfluous, and should not be undertaken.

(iii.) To a great extent, ports are protected by those ships which it is necessary to provide for defending trade in their vicinity. That in consequence, if it is a question of providing ships or ports, and both cannot be provided, the former should be preferred.

(iv.) Fixed defences are desirable for the naval arsenals and great commercial ports at home, to hold them against a dash made by ironclads, which had succeeded in evading our blockade, until such time as we could depend upon overtaking them with a superior naval force.

(v.) Similar defences are necessary for naval arsenals abroad. They should be on a much smaller scale than those in (iv), as not being open to attack from a heavy force despatched from Europe.

(vi.) Coaling stations and commercial ports abroad should be defended against one or two fast cruisers, which had succeeded in defeating the naval force keeping open the port. Allowance should be made for their having already fought an action.

(vii.) The cases of smaller commercial ports at home must be considered according to their relative importance; observing that an enemy's cruiser could blow in dock gates, and do much damage in half an hour.

(viii.) The defence of all naval bases and commercial ports should be under the control of the Naval Administration, and consequently the charges for them should be borne on the Navy Estimates.

Vice-Admiral Sir NOWELL SALMON, V.C., K.C.B.: I can hardly claim to take any part in this discussion in the few remarks that I shall make. I feel, however, very great interest in the subject, and also in the writers of the two essays that are before us. Both of them served under me on two different stations, and it is very much on that account that I have come up here to-day and asked to be allowed to open the discussion. The two essays run on parallel lines up to a certain point and then they diverge on a very important question. Taking first the prize essay we have, I think, to thank Captain Craigie for having laid down for us a very concise and a very useful working scheme for the defence of the Empire and trade. He assumes that we should have a certain number of ships, which I trust we may have, and I trust also we shall have sufficient Officers and men to man them. That appears to be our difficulty at present, we cannot train our Officers and men so fast as we can build the ships. I hope that will come before very long. Under that head I should like to make a remark about the Naval Reserve, which our naval authorities are apt very much to trust to and to quote on all occasions where the sufficiency or insufficiency of the personnel of the Navy forms a question. I must say I do not think four handspikes and an old truck gun are sufficient to train a Naval Reserve man. With regard to the armament of the ports I have nothing to say, except that I agree with Captain Craigie that our coal depôts require an armament of a certain sort, but I do not think that they require to be made into Gibaltars. As a rule, a Royal Engineer does not like to undertake the fortification of a place unless he can go to all lengths, and he is quite right from his point of view. But, unless we lose the command of the sea, these fortifications will be called upon only for defence against desultory attacks, and if we do lose command of the sea no fortifications and no force that we can put in them will serve to keep those ports for us. To touch upon the minutiae of the defence of the coaling stations, it is objected that the mine-fields are in the hands of the Royal Engineer instead of in the hands of the Navy. I suppose the reason is pretty generally known that when this was decided upon, the naval authorities said that they could not afford the Officers or men to undertake it, and I suppose if it were proposed to make the change now the same answer would be given, that we had not the Officers

or men to undertake it without a considerable increase, and that increase takes a very long time to bring about. The point on which the two writers split is that of the government and garrisons of the coaling stations abroad. One of them wishes to take under the naval command only the smaller stations, such as Ascension, the Falkland Islands, St. Helena, and such places, which we may say have no fortifications and no garrison, and require very slight ones. The other essayist, Lieutenant Smith, wishes to take under the naval charge all our distant coaling stations. As you will remember those not only form part of the Colonies, but are, many of them, at the headquarters of those Colonies, such as Singapore, Hong Kong, the Cape of Good Hope, and others; I think that is utterly impracticable. In the first place, if you are, as is proposed, to replace the garrison with Marines, we shall require not only the Infantry and Artillery that we already have, but we shall also require Marine engineers, we shall require Marine supply departments of all sorts and descriptions, and in some cases I am inclined to think we shall require what is now the mythical horse marine. Then again, even supposing that you have this Marine Force to garrison these ports, you have still a Governor in the Colony, and your Colonial Governor is by his commission also the Commander-in-Chief, and he will be in command, just as he is now, of the military forces. Therefore, from that point of view, I see no gain in the change. He would object naturally to the Admiral carrying off any part of his defensive force. There is another point which, speaking as a naval man who has been placed in such positions, I think a strong one. It is proposed that the Admiral, the naval Commander-in-Chief, should be supreme over the coaling ports, which are also the headquarters of Colonial Governments. I am inclined to think, speaking from my own experience, the Admiral would be very sorry to have anything to do with it. He would have quite enough work on his hands. He should be free to leave these places to the defence of those who are there for that purpose, and free to go where he likes. I doubt if any Admiral who ever commanded a station would wish to be tied down to it. As to the smaller places, such as Ascension, St. Helena, and the Falkland Islands, there is no real reason why they should not be under Admiralty direction, for the reason given by Captain Craigie, that is to avoid dividing up regiments into small detachments. Ascension is already a ship. There is not a soul on board of Ascension that is not receiving rations from the Navy, even to the milk. Falkland Islands is in the same condition. There is no population. The population that would be imported for the purpose could very easily be put under martial law. St. Helena, unimportant as it is and small as it is, there would be a great difficulty about. St. Helena has a responsible Government, and there is a population to deal with, and the Admiral would be mixed up with all sorts of questions foreign to his own business, quite independent of the garrison. I think I have said all I wish to say in introducing this subject to you. Both Officers are now serving away from England, and I wish to give them, in sailor's phrase, a "good send off."

Rear-Admiral BOWDEN-SMITH: Before I proceed to offer any remarks on the subject of these essays, I should like to join with Sir Nowell Salmon in congratulating the two Officers on the very excellent papers that they have given us. They are full of interesting matter, are fairly short and concise, and both Captain Craigie and Lieutenant Smith have evidently taken great pains in working up their facts. I am very glad to notice that both these Officers recognize the necessity of fixed defences for some of our naval ports and coaling stations, because I was afraid a certain class of Officers were agitating for the abolition altogether of such defences. But, though I believe in the necessity of fixed defences for certain of our naval ports and coaling stations, you will see from the remarks I am going to make, I do not go so far as those Officers do, and I should wipe out of the list some of the places they have mentioned. I shall confine myself entirely to our coaling stations abroad, for it is impossible to speak of everything in the few minutes allowed us. With regard to coaling stations throughout the world, I think the great point to be considered is that they should be on the main routes, and places, used by the mercantile marine under ordinary circumstances. I have two reasons for saying this: first of all we are sure to get good coal, coal that has not been kept long in stock; and we are sure to get that coal put quickly on board, because there are all the appliances for doing so and plenty of labour. Thus if you coal at places like Malta or Aden you get good fresh coal and

quickly delivered ; but if you get coal at purely naval places, like Trincomalee in Ceylon, or Port Stanley in the Falkland Islands, you will often get very bad coal, which has been a long time exposed to the air. It may be said that is the fault of the Admiral on the station, but this is not so. For instance, taking the East Indian station, the orders used to be that the Admiral never should allow the stock of coal at Trincomalee to be less than 500 tons. Well, in making his arrangements for the coming year, he orders, we will say, 2,000 tons of coal for that place to supply the East Indian Squadron. Just after he has made these arrangements the whole squadron, perhaps, is called off to Burmah, or, as actually occurred the other day in Sir Edmund Fremantle's time, when the Zanzibar coast was attached to the Indian station, the whole fleet was on the African coast nearly a year blockading. The consequence is, in such cases, that the coal ordered out to the naval port remains there, and deteriorates in a very rapid way, especially in a hot, muggy climate like that of Ceylon ; and I well remember on more than one occasion, after taking in coal at Trincomalee, the Chief Engineer coming to me and saying that he could hardly keep steam, the coal was so bad, having been so long exposed on shore, and was like so much dirt. Another reason why the coaling stations should always be on the main route is that these stations are not only required for coaling purposes, but they are also harbours of refuge, where our merchant ships can run for shelter in time of war if chased by an enemy's cruiser. Of course if they were off the main route they would not be so convenient for that purpose. We know that in some cases the naval port or coaling station does not and cannot coincide with the mercantile port ; thus, for instance, Simon's Bay, at the Cape of Good Hope, though not a mercantile port, would become of such enormous importance in the case of the Suez Canal being blocked that we should certainly keep it armed and garrisoned as well as Table Bay. Having made these preliminary remarks, I will just run through our coaling stations of the East. We have first of all Gibraltar and Malta. Then, on the other side of the Isthmus, Aden, and Colombo in Ceylon, and so on to Bombay and Kurrachee, if we are going to India, or, if we are going further east, Singapore (our most important coaling station) and Hong Kong, the latter being our terminus in that direction. I suppose there is not much difference of opinion about retaining the places I have mentioned, although I do remember one Officer who read a prize essay here some time ago, advocating the giving up of Gibraltar, a place I should never relinquish, because, although the Suez Canal might be temporarily blocked, it would be a most valuable base for the protection of our trade passing to and fro the Cape and the South Atlantic generally. There is one other place mentioned on this eastern route by the lecturers, and that is Trincomalee, in the north-east corner of Ceylon, and that is one of the places I should strike out. It is off the main route, and is not used by the mercantile marine. It is certainly a fine harbour, but a fine harbour if it is off the route will never be used by the trade. The competition is too keen, and if a harbour is only 100 miles off the route merchant ships cannot use it. It was a very fine harbour in the old days when a ship wanted caulking throughout, and wished to refit her sails and rigging, but that is a thing of the past ; there is no dock at Trincomalee nor plant of any kind for repairing machinery ; therefore it is of little use, and men should not be locked up there. You may say that Colombo, about 200 miles distant, is rather a confined place, but although the port inside the breakwater is rather confined, the roads are extensive and safe in all weather. I have myself lain out there in a sloop during the south-west monsoon, and any quantity of shipping could assemble in the roads. Trincomalee should still be used in time of peace, but why waste our strength on fortifying an empty harbour ? Let ordnance and other naval stores be kept at Bombay and Colombo, and let the latter be our only fortified position in Ceylon. I am now going to say a few words about the Falkland Islands, as they are marked out by one or both of the essayists to be fortified. I speak of these islands with some diffidence, because when the First Lord of the Admiralty made his usual statement this year in presenting the Navy Estimates, he hinted at the probability of one of the harbours in the Falkland Islands being selected for an armed coaling station. My reason for taking out the Falkland Islands from our list, as not necessary to have fixed defences, is that they are off the main route, and are not used by ships of the mercantile marine, unless

driven in by stress of weather or some other cause. I know the Falkland Islands well, and have passed many pleasant days there, and for the sake of its hardy inhabitants (the population is about 2,000) I wish a naval station could be established there, but we must consider Imperial interests and not individuals. I am aware that the islands possess beautiful harbours, though somewhat shallow, but the Colony will never be of sufficient importance to warrant our having anything like an armed station there. The communication with the Falklands is very indifferent, being limited to about one steamer a month, and there is no cable to Port Stanley, so that when there one hears little or no news from the outer world, and telegraphic communication could only be established at the expense of the Imperial Government. I do not suppose the islands would ever carry more than one million sheep, and that amount of wool is, of course, a mere bagatelle compared with that imported from other places. Gentlemen may say, "That is all very well, but how are we to guard that trade route through the Straits of Magellan and round Cape Horn in case of war, and how are we to supply coal to our cruisers?" My answer is, if we are to have cruisers down in that part of the world we must either have cruising colliers with them or colliers sent to meet them at arranged rendezvous, and I believe that will have to be done in war-time much more than we now imagine. I know no part of the world where you could more easily transfer coal from colliers to cruisers than on that station. All down the coasts of Brazil and Patagonia there are plenty of uninhabited bays and headlands, in which, or under the lee of which, you could transfer the coal quite easily from the colliers to the cruisers without anybody being present to say no, or talk about international law. Or if you find it absolutely necessary to have a coaling station at the Falkland Islands during a war, you might send a small naval expedition out, and occupy one of the harbours temporarily. That would be a far better plan than locking men up to deteriorate in that out-of-the-way locality. We had a lecture last week on torpedo-boats, and we have had lectures on naval warfare generally, and we are very much obliged to any gentleman who will take part in the discussions; but I have often thought that on such subjects we are rather talking in the dark, because we have had no naval warfare since all these modern inventions have been introduced. But when we speak of our trade routes and our food supply we have the most valuable statistics to help us, which are all of interest to Englishmen generally, and to naval Officers particularly. I allude to the Board of Trade Returns, and there we can see where our principal imports come from, and which will be our most important trade routes and coaling stations, and those that we ought to protect at all hazards. I suppose you will all agree that our most important imports are bread-stuffs and raw material for our manufactures, and of those raw materials I suppose two of the most important would be cotton and wool. Referring to the Board of Trade Returns for 1891, I make out that no cotton comes to us by the Cape Horn route. With regard to wool, there is no doubt that the wool from New Zealand comes by the Cape Horn route, but I think all the New Zealand wool and other exports in time of war must be diverted to the Cape of Good Hope route, that route being rendered absolutely secure for the whole of the Australian trade. It would be rather longer I admit for New Zealand, but regulation in war-time must be submitted to. With regard to bread-stuffs, and speaking only of wheat and flour, we find that wheat comes from Russia, Turkey, India, Australia, and many other places; and it also comes to us largely from the United States. And here I am going to say something which may appear at first sight against my argument, because more wheat comes from the western seaboard of the United States than from the eastern or Atlantic seaboard, and that from the western coast does, doubtless, come to us by the Cape Horn route. Thus, last year the wheat imported from the Pacific ports of the States was over ten million hundredweights, whereas from the Atlantic ports it was only six million hundredweights, but with regard to flour, which I may call manufactured wheat, we received nearly eleven million hundredweights from the Atlantic ports, and only one and a quarter million from the Pacific. Taking wheat only, I make out that one-fifth or one-sixth of the whole quantity imported probably comes by the Straits of Magellan or round Cape Horn. Perhaps you will say if that is the case, it is an important quantity, and that route must therefore be secured, but you must recollect that in war-time high premiums and war

risks would prevent wheat being sent by this long sea voyage, except in neutral bottoms; and a great deal of that wheat and flour which is now shipped from the west coast would find its way overland to the east coast, and be shipped from thence. Not only that, but in the distant future we shall get less wheat from the States. Every year the population of the United States is largely increasing, and they will require more of their own bread-stuffs. Other parts of the world will be able to supply us, for instance, the Argentine Republic is already beginning to send us a considerable quantity, increasing every year. Other routes also will be opened, for although the Panama Canal is virtually abandoned, there have been already sixty millions sterling sunk in it; I believe the Nicaragua Canal will probably be accomplished, as the estimate of twenty millions sterling for its completion is a moderate one. I maintain, therefore, that the Cape Horn route is not one of the first importance to England, and we should not commit the mistake of erecting fixed defences at the Falklands to protect it. My friend Admiral Colomb read a paper here, about a year ago, on the subject of fixed defences, which rather alarmed me, as I thought he advocated giving up all such defences, even at important coaling stations; but from what has fallen from him since, I am inclined to think I misunderstood him, and that he merely means to say we should reduce them as much as possible, and not to have more men locked up than we can possibly avoid. If so, then I am with him. With regard to trade routes generally, what I maintain is this, I would far rather have three trade routes efficiently protected and properly patrolled than four or five inefficiently protected and improperly patrolled. As to the garrisons, I think all the large fortified stations should be held by our military forces as at present, as we could not afford to have our seamen or Marines locked up by thousands in such places. They get little enough sea service as it is, and in that case some of the men would get none at all. But with regard to the smaller places, I should be very glad to see some of them garrisoned with Marines and Marine Artillery, both those splendid corps being proportionally increased.

Colonel MOODY, R.M.L.I.: The very important essays which are before the meeting call for the most careful and deliberate discussion, because the keynote of the whole is really and actually how to obtain the maximum value out of our existing (and immediately probable) means of defence. Both essays show a very masterly grasp of the subject, and have dealt with it on good broad and common-sense lines, but there are some matters touched upon by Captain Craigie which appear to me to require a little further elucidation, and which deserve some rather close criticism lest the power and capability of one branch of the Navy, the Royal Marine Corps, should be overlooked in considering the question of Imperial defence, a result which I feel sure that Captain Craigie did not wish, as evinced by the way in which he has spoken of the corps. On points 1, 2, and 3 of those laid down for discussion I propose to offer no observation, as, though not by profession a naval strategist, I cordially agree with Captain Craigie; but on points 4 and 5, those being the points on which, during thirty-seven years' service, I have thought much, I should like to offer some observations. Point 4, I do not agree with Captain Craigie's suggestions as to the naval fortresses, with the exception of the main ones such as Malta and Gibraltar. I think that for maritime fortresses naval control is the best. I cannot see how the Admiral on the station would find his hands tied any more than the Commander of a field army based on a fortress finds his hands tied by the requirements of the defence of the fortress. I cannot imagine, as stated in the discussion, that any friction would arise between the Governor of the station and the Admiral with reference to the Marine garrison if the Governor was independent of the Admiral. It appears an anomaly in England that the Marines on shore should be under the command of the General Officer Commanding for discipline, but it works well, and has stood the test of many years' experience. A localization of torpedo-boats and harbour defence craft I think admirable. The placing of the submarine defence *at all ports* in the hands of the Navy I think essential, though I am fully aware of the difficulties in the way of such a course in the present state to which the question of harbour defence has been brought. Submarine mining is not, I understand, a popular branch with the Royal Engineers, and it is scarcely a judicious measure to give the Army sole control of the mine-field through which the Navy must thread their way. The submarine mining and

all harbour defence might well be performed by the Royal Marines, assisted, if need be, by the Militia and Volunteers, and the naval system of mining should be adopted. It appears out of the question to expect the country to vote upwards of 19,000 men for the defence of their coaling stations, nor should a standing force of this size be required. At most stations the ordinary garrison should only be a nucleus, who should be employed to train the local forces already in existence or who should be raised, and who should be called out as required. I cannot imagine a more suitable body to carry out this training than the Royal Marines. It is well known that they get on well with those with whom they are thrown in contact, both in and out of the Service, at home and abroad. I need not remind the majority of this meeting that it is only the individual and conscientious care on the part of the Officers and non-commissioned officers which turns the raw recruit into the highly and carefully trained marine whom we embark. Ship work gives self-reliance and adaptability, but it would be of little use if the shore-training were omitted. The same individual training could be given to the Colonists, and thus, without unduly drawing on the resources of the mother country, the Admiral would always be confident that his base was safe, since he would know and have the control of the forces to which it was entrusted. He need not have any anxiety as to having to work out military problems, for he has Marine Officers whose business it is to do this, subject to his approval, and he will, I am confident, find them just as efficient and up to the mark as fortress Commandants as any Officer in Her Majesty's service, making no exception whatever. Captain Craigie has told us that now the *bonâ fide* seamen number 20,000. The Royal Marines number 14,000. Both branches, the seamen and Marines, are highly trained; but I maintain that the country does not get its full value of the Marines. This corps is capable of economical and rapid extension. It is cheap and very efficient; it can be largely increased without in the smallest degree impairing its efficiency as a naval force. At coaling stations, there being a nucleus, the force could take their turn for sea in the ships on the station, being relieved by a similar number afloat; thus the difficulty mentioned about sea training could be overcome. The Fleet are more likely to be increased than the coaling stations. The Marine submarine miners can be embarked or not as required. Thus, by placing the coaling stations under naval control, and employing the Royal Marines to man them, you will increase the efficiency of the corps, which will then have a future, as at present I am tempted to fear they have not, and last, but not least, the pocket of the country will be spared. In conclusion, I would say, think on these facts, and do not overlook this branch of the Service, but let the corps, which is proud of its connection with our glorious naval history of the past, have a more pronounced share in the naval history of the future, a share for which they have honestly striven to qualify themselves by steady discipline and patient perseverance, turning their hand to anything required, and keeping well abreast of the professional changes of the past half century, that they may be well able when the struggle comes to bear their part in the defence of this great Empire. To send them to the minor and out-of-the-way coaling stations only would be a grave error; it would be better to keep them out altogether.

Commander SULLIVAN: I should not have taken any part in this discussion had it not been for the attack made on the Falkland Islands. Having been the first person born there under the British flag, when General Moody was the first Governor, I naturally take a great interest in the place, and know something about it, and I rather think Admiral Bowden-Smith has under-rated rather than over-estimated the number of inhabitants. The whole of the land is taken up by settlers, and one company alone pays 27 per cent. on its 100% shares, which cannot be purchased under 250%.

The CHAIRMAN: That is not the point of this discussion.

Commander SULLIVAN: I will go on to the importance of the place as a coaling station; but Admiral Bowden-Smith said the place had not sufficient trade to make it of importance, and I wish to show that that is not so. Another point is, it is the only place, I think, between England and New Zealand or Vancouver's Island on that route that is in the possession of the British Government. The South-east coast of America Squadron will require a place for coaling, and there is no other place they can go to in case of war. They could not, in the case of war, go to a foreign

port for coal, and the Falkland Islands is the only port that they could coal at. There is already a force of Marines at the Falkland Islands, which might be augmented, and, as Admiral-Bowden Smith says, there are splendid harbours of every sort. I do not think the Falkland Islands could be left out of the list of coaling stations.

Admiral LONG : Sir Vesey Hamilton, ladies, and gentlemen, there are one or two points that I should like to remark upon in these essays. I think the Institution and the authors are both to be congratulated on the great amount of information and the way it is put together in these essays. I have read them with great interest and profit. To begin with, the preamble states that the supremacy of the Navy is the great point, and I think that most probably what is at the root of the whole of this matter really is that the supremacy of the Navy means an offensive policy on the part of the Navy—the first thing the Navy has to do is to attack—a policy of attack, and therefore the question of defence will undoubtedly only take second place. I agree generally with the author of the prize essay in advocating the maintenance of the present state of affairs, that is to say, that the shore defences should be in the hands of the military. Everything on the sea should be in the hands of the Navy, and where the sea and the shore come in together, then I believe the Marines will give their very valuable assistance, and the more we have of them the better. There are one or two points of detail that I might refer to. Captain Craigie refers to the “Royal Sovereign” and the “Centurion,” where he advocates more vessels being built. This is a subject of such very great importance that I do not like to let it pass without saying one word. It appears to me that there is a misapprehension in what he says with regard to the “Royal Sovereign” class as being too big and too complicated, and that there is “a growing feeling against these unwieldy monsters.” Now a large ship is by no means necessarily a complicated ship, neither is she an unwieldy ship. I wished to say this because it might go forth from this Institution that a big ship should not be built, and that she is complicated and unwieldy. Probably Captain Craigie is right in the argument, but the reason that he has given is not a sound one. If you say a big ship is equally likely to be destroyed by an 18-inch torpedo as a smaller ship, then I think you have a very strong argument against big ships. The 3rd point in both authors’ summary of conclusions is “That these fixed defences are of little use, since they could not keep the entrance of the port clear or prevent the attack of torpedo-boats without a floating defence” in the vicinity. We must remember, in the event of war, our large mercantile ports will need vessels in the offing, and I think it is a great question whether these vessels should not be manned and controlled entirely from those ports; I do not see why they could not be. I believe the principle of decentralization and local organization is most important in an Empire like ours, and that if ports like Liverpool, Glasgow, the Tyne, Hull, and perhaps some others, were furnished with suitable vessels, and the control of them placed in the hands of the superintendents of great companies in those places, in the same manner in which the railway system of the country is meant to be worked in time of war, you will find by getting the local talent and of course local interest, which is far greater than any other interest in such a matter as that, you will strengthen the country very much. Sir Nowell Salmon remarks that truck guns and handspikes are not the things to train the Naval Reserve of the present day. I cordially agree with that, and I think, if you will look at the Report of Sir George Tryon’s Committee, and will read the list of vessels, the drill-ships for the Royal Naval Reserve, you could not but wish that instead of those vessels he had really sea-going fighting vessels. If those vessels were placed at ports, and placed more or less under the control of local people who had a direct interest in the matter, and who are all exceedingly practical people, I believe they would do well. Of course the Coastguard ships will be all withdrawn, I presume, when war breaks out. We have a Coastguard which, I have understood, is to be withdrawn for general naval service in such an event. In the same way the fixed defences should be in the hands of the Army. Lieutenant Smith says that it would be a good thing to put these into the hands of the Navy, because, when war breaks out, you would then have a lot more men to send afloat. It seems to me that that is putting the cart before the horse. The object of organization for the fixed defences is to have people on

the spot who are always doing the thing, and I should go in myself for the permanency of the personnel of the fixed defence, and I should give control locally. I think that that would be the most practical method of doing it; although I quite admit that our sailors and marines would do it quite as well as anybody else, perhaps better. I am still of opinion that the Royal Engineers would do it quite well enough, if Royal Engineers or artillery are always doing it and are not taken away directly war breaks out. It must be evident to everybody that whatever is said in this theatre in favour of altering the existing system of affairs is likely to carry exceedingly little weight now when we are looking forward to a general election; but anything which is said here which may in any way conduce to the more effective working of the system that already exists, it appears to me may be of some use, and I should like to say that those defences which already exist, which are now organized, should be tested a great deal more than they are, by combined action between the Army and the Navy. There is unity of spirit between the two Forces, and it wants to be put more in practice. If that were done more than it is, certain ludicrous facts which are known to many people would not exist; the mines of defence would be in the proper place, and not in the wrong place, and whatever corps may execute the work of installing a mine-field, the plan of it and the locality it is to occupy, should receive the concurrence of the Hydrographic Department of the Admiralty. If that were done, there could not be such a thing as putting a mine defence in the wrong place. It is very often said "a bad law well administered is better than a good one badly administered," and our present system, which I admit is utterly illogical, may act uncommonly well in war. We are accustomed in this country to get on in that sort of way, and I think perhaps we may go on doing so without disaster, if practical co-operation between the Forces can be insured.

Major G. CLARKE, R.E.: I cordially endorse all that has fallen from the previous speakers as to the excellence of the papers under discussion. I think the prize essay, especially in the arrangement of the matter, the clearness of the style, and the business-like way in which the whole subject has been treated, reflects the utmost credit upon the writer. I am the more glad to say that because I find that I disagree with most of his conclusions. In the first place I cannot believe in handing over torpedo-boats to Volunteers; it seems to me that is the very last weapon we can entrust to amateurs. In the second place I see Dover is classed as a first-class naval port which an enemy would make great sacrifices in order to injure. Now I have not the slightest idea what there is at the present time to injure at Dover, except the Lord Warden Hotel. It is perfectly true when you get your harbour there, which I only hope you will get one of these days, there will be a case for some moderate defence of Dover; but at the present time we have large defences at Dover, but no port, and those defences seem to me to be at least premature. I have not in fact the slightest idea how Dover came to be fortified at all. Here is the opinion of the Duke of Wellington on this point. When he was asked by the inhabitants of Dover to increase their fortifications, he wrote, "The fortifications of Dover would be no doubt very useful if the enemy came in that way, but I do not think he would. They might also be very useful if the enemy went out that way, but I do not think he would." That was the opinion of the Duke of Wellington. I also find that in the Prize Essay our old friend, the Minister of Defence, crops up. I did hope the Report of Lord Hartington's Commission had gone far to kill that double-headed hydra. I do not know what the effect of such an office would be upon the Army, but I am certain it would be disastrous to the Navy. In the "Pilgrim's Progress" there was a certain Mr. Facing-Both-Ways, whose career, as far as I remember, was not successful: I do not think he got very far on the road to the Happy Land. But what I differ from most in the Prize Essay is the enormous increase of expenditure involved, and the great increase of defences which I consider already exaggerated. One other comment before I pass from the actual matter of the Essay. I find that though something is stated about geographical conditions as affecting the standard of defences of ports, yet places such as Belfast and the Mersey are placed in the second class. Those two ports are almost in interior waters. It seems to me if naval supremacy is to have any special value, it is in such waters as those, which can be easily watched. They are in a totally different position from others, and

they need not be placed nearly as high as the second class. Then I find Madras, which I did not know was a naval or a great commercial port, is treated on the same footing as Singapore, which, in my opinion, is the most important strategic point of the Empire. Then again, Calcutta, which it seems to me is amply provided with defences by nature, receives fortifications, whereas Rangoon, which is very much more accessible, gets no defence at all. I think the whole point really is one of scale. Admiral Colomb, we know, is looked upon as somewhat of an iconoclast in regard to fixed defences generally. I do not, however, understand him to have said that fixed defences were useless; all he objects to is the scale which has been adopted, and in that I agree with him. During the last thirty years, as far as I can make out, we have spent something like twenty millions upon fixed defences; besides that, of course there are charges which one cannot possibly estimate. If you once get your standard wrong, it involves an increase of annual charges which nobody can put into figures. As to the difference of scale which two men approaching a subject can adopt, I remember a case of an estimate being made for the defence of one of our ports abroad. The expense was put at 332,000*l.* by a military Officer. The same port was afterwards estimated for by a naval Officer, who also went to the spot and investigated the matter, and he asked modestly for three 5-inch guns, so that in the one case the cost of the defence would be 20,000*l.* and in the other 332,000*l.* That shows how the scale may vary, and the enormous difference that the point of view makes. Both these Officers were doubtless right, only they looked at the thing from a different point of view. Can we not lay down one distinct proposition that in all questions of this nature history is our only guide; and thus anything else must be more or less speculation? I think you will find that we are not altogether without modern experience which gives us every reason to believe that the past will repeat itself, and that we may absolutely rely upon the teaching of the old wars. For instance, there was the action at Lissa, in which smooth-bore guns, without any great difficulty, completely repulsed an armour-clad fleet. Then we were much astonished at Alexandria, at the large amount of ammunition expended in silencing the guns on shore. Exactly the same thing happened in 1704, when Rooke took Gibraltar, which had a garrison of only 150 men. He so far depleted his ships of ammunition that he actually risked the loss of the battle of Malaga which followed, an action of the greatest importance. Coming to last year, you have the little Chilean war. Valparaiso was a place heavily fortified, but nobody ever looked at the fortifications there. The Congressionals simply went round them. To take Valparaiso, it was necessary to defeat Balmaceda's troops. They, therefore, simply landed at Quinteros Bay and went straight for those troops. If there had been only half a dozen guns at Valparaiso, it would have been exactly the same; they would have been left alone. I think one false standard of defence has, in a great measure, arisen from want of a scientific study of history, and I wish particularly to say a word about what I may call the decoy argument, which is a very favourite one. It appears in the Report of the Commission of 1859, and runs right through the remarkable letter which Lord Palmerston wrote to Mr. Gladstone on the subject of fixed defences. Since then it has appeared in books, newspapers, magazines, and in this theatre, and it will probably go on appearing at intervals. How does this decoy theory arise? Entirely out of an utter misrepresentation of the events of 1805. Popular history describes them somewhat in these words, "Nelson was a great fighting man, but withal a very simple person. He was watching Toulon: the French got out, and they led him a wild-goose chase to the West Indies, where he foolishly followed them, returning only just in time to fight at Trafalgar. The fate of England trembled on a mere chance. If the winds of the Atlantic had been contrary, England would have been lost." That is the history we teach to our boys. What are the facts? On the 25th of April, 1805, the Admiralty wrote to Lord Nelson and told him that a specified force—and they specified the smallest details—had sailed from Toulon, and that orders had been sent to the "Queen" and "Dragon" to go from Gibraltar to Barbadoes, "provided your lordship has not detached from under your command a number of ships equal to that of the enemy which passed through the Straits on the 9th instant." The Admiralty trusted that Nelson had already detached those ships. Nelson never got those orders. He

went after the enemy, as any British Admiral in his circumstances would have done. I do not suppose that the Admiralty had completely fathomed Napoleon's plan, but they fully provided for every contingency. They provided for the reinforcement of the West Indies in case Nelson had not detached a force to go there, and they provided for the gathering together of their forces in the Channel. Nelson returned, but, before he reached home waters, Villeneuve had fought the action with Sir R. Calder, off Finisterre, and there to an inferior squadron he lost two ships. Was that the kind of force which was going to clear the Channel and make way clear for the invasion flotilla? The fact is the French had not the slightest chance of invading England in 1805, and this was not due to fixed defences, but to the British Navy. Napoleon never meant to invade us at all; he had an army to create, and by creating it on the shores of the Channel it answered the double purpose of being organized to crush Austria, and at the same time hampering the action of our Navy. In that he succeeded, and the success went no further. I have laid some stress upon this decoy theory, because it seems to me one of the stock arguments now advanced in favour of an exaggerated standard of fixed defence. The decoy argument has had a long life and has done a great deal of harm. I think we might now give it decent burial and have done with it. What does naval supremacy mean, and command of the sea as laid down as the postulate of the essay? It means that you want to bring on a fleet action and the enemy does not. It means that in time an enemy's ships will be mainly collected in his fortified harbours. It follows that those harbours will be, not blockaded, but closely observed, and ships escaping therefrom will be followed up. In the long run it means, if maintained, the gradual disappearance of the enemy's ships from the sea. Meanwhile there is no sort of naval strength that we could possibly provide in this country which would absolutely guarantee, especially during the first few months of a war, that the enemy's ships, single ships, or in pairs, might not move about the sea. Such ships might attempt raids on undefended ports, and it is against those raids—mere raids—that fixed defences are required. The analogy from military matters seems to be just this: A powerful army is advancing into an open country; the enemy has a considerable light cavalry force, small parties of which may find their way through the advancing columns or round their flanks. The General in such a case does not wait to build fortresses to protect his communications: he simply makes a few light defences against cavalry raids. That seems to me to supply some idea of the standard of fixed defences necessary for the British Empire. The reply is always "Oh, but you have not got the necessary naval strength!" Then let us stop every single penny of expenditure on our fixed defences until we have got the necessary naval strength. We must have a Navy, and a powerful Navy, to maintain our supremacy at sea. If we have not got that Navy, the Empire cannot be defended in war even if every port is made impregnable. Given that absolutely necessary Navy, what remains for fixed defences to accomplish? That is the question, and I do not think in the prize essay the full effect of naval supremacy has been taken into account. It seems to me that the writer was led away by the fascination of fortifications just as some of us have been led away, and goes a little further than we have done. Coast defences are generally spoken of *en bloc*, but practically they can be divided into two parts: first, guns and mines required to deny certain waters to ships; and, secondly, garrisons. History shows that ships were always shy at facing the fixed defences of European Powers; very small fixed defences have always served to keep them off. On the other hand, navies, and our own Navy especially, have been very ready to make land attacks against which garrisons had to be provided. The reason is obvious; nearly every place has its back door: why on earth go and knock your head against fixed defences, when you can go in the other way, and when you must go in the other way in most cases in order to effectually occupy and use a harbour? It is wrong to suppose that by merely bombarding a port you can go in and use it. You cannot go in and use it unless you have landed and defeated the troops on shore. That is where the question of garrison comes in. The exaggeration which has occurred with us takes the forms of putting in far too many guns and mines. In some cases I think we have starved the garrisons. In conclusion let me make one appeal to the Admiralty. If you will not take the responsibility for fixing the

standard of our coast defences, will you not lay down some few authoritative data on which we can act? If we do not accept those data, then pitch into us; but if we have no authority to guide us, it must be that we shall sometimes run into excess, and then you come and tell us that we have spent the money that you need for the Fleet. Let me take one illustration. There is the case of the River Thames. Will you lay down for us whether it is reasonable and probable to expect that an enemy's battle-ships are coming up that narrow river as far as Gravesend? See what depends upon this? If they won't come up, then what do we want with all those armour-piercing guns that we have on the Thames, what do we want with the mines and the Brennan torpedoes? See the difference it makes if we have that one single point laid down for us. Oliver Wendell Holmes has told us that the Romans won the world with the short sword, and lost it when they adopted the long one. It seems to me that this provides a lesson for us. The short sword means getting close to the enemy, getting as close to him as you can; the long sword means waiting behind defences for him and prodding at him. We won an Empire and we maintained it against the world when we adopted the policy of the short sword. If we adopt the policy of the long sword; if we wait behind fixed defences for the enemy to come to us to be shot at or blown up, then we shall certainly and deservedly lose an Empire such as the Romans never swayed.

Admiral COLOMB: I should like to join my congratulations with others to the authors of these most admirable and lucid papers. Besides the way in which they are drawn up and prepared, they show, I think, so distinctly an improved opinion, that we congratulate them and congratulate ourselves and the Institution on the change. I think the first thing we may note is, the recognition that the defence of this Empire is naval and military; that it is not, as it used to be said, that the Army is to be left alone to defend the ports and forts, and so on, and that the Navy is to do something else not defined. I think it is now better understood that the two Services work together; did work together in the past, and will work together in the future. That is the pith of these essays, and, in consequence, in them you have no claim put forward to fortify places on the understanding that there is no Navy possible to help in the defence. That, I hope, has passed away for ever; but it has been distinctly laid down, over and over again in the past, that the scale of fortifications should be governed by the idea of an absent and helpless Navy. Nor shall we have again, I think, an author like Sir Charles Dilke inferring in his work that, when an Officer commanding a distant station says he has no doubt he will get on very well with the assistance of the Navy, he is in a bad way. Those were Sir Charles Dilke's inferences in his former books, but his later books seem to say little in that direction. There is shown in these essays, too, a better estimate of the time element; how the time element governs the possibility of attack, and how, unless the circumstances allow not only time enough to do the work that is to be done, but an immense margin besides, the enemy will not make attacks. But I am not quite clear in my mind as to the way in which the prize essayist has looked at the problem set before him. The question is, as I have read it, "How far maritime supremacy requires the assistance of fixed defences?" or, to put it in another way, "Can maritime supremacy be established without fixed defences?" or else you may take it that, "Maritime supremacy being established, should fixed defences be added?"—for, I suppose, for convenience—or it might be taken, "Are we to defend, by fixed defences as necessary to support an inadequate fleet?" or, lastly, "Are we to defend, by fixed defences in case the Fleet should be beaten off and destroyed?" As far as I understand them, both essayists have taken it that maritime supremacy is established, and that the question of the fixed defence is more than ever one of convenience. There is another way of looking at the problem. You may ask whether your defence should be to meet occasional lapses, which I think is the point that Major Clarke has addressed himself to. And there I find we are in agreement. I think we must look forward to maintaining our Navy so that it shall not be driven into these ports. That is to be our policy, at any rate, and then it follows that it is only occasional lapses of the naval force that need be provided for. But I think both essayists ought to have argued this question out; I think they ought to have taken it whether, as it has been constantly said, if we have fixed defences, the force of the Navy need be less con-

sidered. I am sorry neither essayist has taken up that point, because I have no doubt it would have been well dealt with if they had done so. We must also consider the question whether we are to be ready to resist an attack when made, or whether we are so to act, that attack cannot be contemplated? We certainly can look at it from those two points of view, and, if we depend too much on fixed defence, we must recollect that the enemy can calculate very accurately what he will have to meet, and, therefore, he is the more ready to contemplate attack in such cases; but he cannot calculate so easily the value of a threat which may be offered to him by a force brought together on the spot in case he makes an attack. And it seems to me that history always shows us that the value of that threat is overwhelming. We know the strength of a fixed defence can be measured, attacked, and overcome. We know how often that measurement was not made, because the real strength of the place was the likelihood of a relieving fleet arriving before it could be subdued. Unless the enemy—so far as I understand—is sure against interference while making his attack, he will not make it at all, and he will not only want that assurance, but he will want a great margin of safety before he does it. In any case, some principle is required for determining the amount of fixed defence, and Admiral Bowden-Smith and Major Clarke do me no more than justice in pointing out that I never for one moment contemplated the idea of abolishing all fixed defence. The only point I strove for, together with others, was not to waste our money too much on fixed defence. I do not think the prize essayist has drawn as much distinction as he might between actual fixed defence and localized defence. I look upon the two things as different. He takes them, you will observe, together, as if movable defence, which was localized to the place for the time, was exactly in the same category with works which could not be moved. Although the essays are both most able and lucid, yet, if you read through the conclusions that both essayists have come to, you will see enough discrepancy to lead us to understand that they have not fully or precisely grasped the whole of the subject, and I must say I think most of us—and I certainly am myself—in the same condition. I do not think that we have got quite to the bottom of it, though I think we are nearer the bottom than we used to be by a long way. The trouble of coming to a wrong decision in the scale of fortification, as Major Clarke has put it, is that we shall either waste our money in exaggerating the scale, or else we shall leave ourselves weak, when we might make ourselves strong for the same money. I think that both essayists, so far as I can make out, do assume the possibility of the maritime supremacy without any fixed defence whatever. That is what I gather is in both their minds; but they think this maritime supremacy might be touched a great deal, and damaged, and a great deal of injury might be done, if you had not a proper proportion of fixed defence. In dealing with the question of localized defence, Admiral Long adverted to the point, as I thought, very justly. The essayists, though advancing towards it, do not seem to have gripped the whole of its consequences, and, therefore, there comes such a curious discrepancy as you find between the first and second conclusions of the prize essay; where the prize essayist, in the second paragraph, clearly supposes a blockade, lasting for days, on some of our ports, and, of course, that blockade is not affected by any amount of fixed defence, but it does not show that maritime supremacy, so far as that place is concerned, has gone for the time. The question of torpedo-boats has been brought into the subject. I am sorry the essayists did not stick entirely to the fixed defence—not going into the question of submarine mines unless they are part of the localized defence. The prize essayist takes a very curious view, I think, in assuming that the enemy will be quite prepared to sacrifice his whole force in attacking a certain port, because of some advantage that he would gain by making that attack. Now, my argument in these cases is always that mankind remains precisely the same from age to age, and I do not know anywhere, in times past, of any nation sacrificing the whole of its force for the purpose of doing something, except in the case of fire-ships and explosive-ships, neither of which ever came to much good. I cannot, therefore, bring my mind to conceive any navy sending a large and valuable force, such as that of several ironclads, on the chance of doing as much damage as the loss of those ships would cost him and no more. The second essayist seems to me to sin a little in the same way in assuming a dash by the enemy's ironclads

against certain of our ports at home—I think he must mean in such a case the enemy will be prepared to make some sacrifice. The point that dwells upon in mind in all these cases is that we have not settled upon what is to encourage the people to make attacks of this kind, which they never made in times gone by. Are modern ships going to do a great deal more damage with a great deal less risk than was the case with ancient ones? I see nothing in modern conditions to encourage the sort of attack which is contemplated. In all cases it certainly was the threat and not the fixed defence, which prevented attack—I won't say in all cases, but in most cases it was the threat which kept the enemy from contemplating the attack. The great difficulty is, what principle are you going to establish in order to regulate the scale of your defence? and Major Clarke has shown us how widely the authorities differ on this point. We want some sort of principle by which we should say how much is right, and how much beyond that is wrong. We should then certainly have advanced to a great extent. I think both essayists—but especially the prize essayist—seems to set up two standards, which, to my mind, are antagonistic. They seem to set up first the principle of geographical conditions and facilities for attacking the neighbourhood of an enemy's ports, and so on; and then, on the other hand, the greatness of the prize. Portsmouth and Plymouth are to be attacked because the prize would be so great there; other places abroad are to be attacked because they happen to be near a possible enemy's port. I myself am rather inclined to think that, if we have our proper supremacy, the point is the amount of force the enemy can bring to bear, and, although he may wish very much to attack a very valuable prize, that he will not be able to get any more force out to do it because the prize happens to be valuable. It seems to me the enemy would be exactly in the same position whether he were going for a small or big place that he would be able to get out so much force and no more, if we were doing our duty properly, and, therefore, logically, I think we do not want more extensive fixed defences merely because the place is itself more important and would be a greater prize. I agree very much with Major Clarke in what he has said, namely that the first thing to be thought about is the garrison. If we fix our garrisons, we should then fortify merely to increase the defending power of those garrisons, and especially with regard to attacks through the back door that have been referred to. I do not agree to the principle we seem to have adopted of massing our heavy fortifications, so as to protect from a sea attack, which history tells us is very unlikely indeed to be made, while the back door is to be left comparatively open. We should commence by saying, for such a place we shall establish such a garrison and then that we will put such works there as will enable that garrison to hold its own against some larger landed force—twice the force, or whatever it may be—for some limited time; but the prize essayist, I suspect, is increasing and not decreasing the amount of fixed defence which is now allowed. His garrisons amount to 42,900 men, which, for this country, is a large force to lock up, and I should be inclined to hope that it might be somewhat reduced. Of course I am only now addressing myself to a few general principles: it is quite impossible to go into details. But the point I have in view, as regards defence, is this: that I note how our naval force has been distributed in previous wars, and I am pretty well satisfied that it was the almost universal rule to localize ships, to attach them almost permanently to ports, for the purpose of keeping them open; and my strong belief is in war—let the Admiralty say what it likes, and let us all argue as much as we choose—that the localization of naval force to protect the entrance to a port, and to protect the ships trading in and out of that port, will be a primary measure, and that we must always assume so much naval force present, and begin with that. The naval force that you are going to have at each of those ports is the beginning of the whole thing. Then you get your garrison behind, in order that the enemy may not come round the back way: and then you build your fortifications, that they may defend themselves should the enemy come round the back way. But I think if I had to write one of these essays, I should have liked to have begun from a totally different point of view. I should like to have begun with the possible force of the enemy, the coal endurance of their ships, what they can do in landing and so on. Then we should see what it was we were open to. They must have coal, they must have stores, they must have bases. They cannot drop from the

clouds into an immediate attack, and they can never calculate now, on not being interfered with. Having ascertained the sort of attack, and the strength of the attack, which it is reasonable to expect, we might establish our localized naval defence—and when I speak of localized naval defence, I find myself coming round more towards regular sea-going men-of-war than towards the kind of defence that Admiral Long has spoken of, which is not perfectly sea-going.

Admiral LONG: Perfectly sea-going; I repudiate anything else.

Admiral COLOMB: We are agreed then. If that is so, you then have your perfectly sea-going force there, and which you would draw together, in the first instance, by an examination of the enemy's powers of attack, and then have your garrison, as I have said, and your fortifications, as far as they were sea-faced fortifications, would simply be supports to the naval defence, in precisely the same way as the shore fortifications would be supports to the land defence. If you approach it in that way, one gets towards the arranging of such a scale as Major Clarke so properly desires. Passing, however, to just one detail or two, I may say that both of the essayists give up the Mediterranean route, and it is common to give it up. For myself, I cannot possibly understand our thinking of giving up that route. It seems to me—I do not like to use strong words, but I must—the rankest nonsense. The prize essay goes a little beyond what we generally do. I can possibly understand our saying, "Give up the Mediterranean, if you have not force enough to hold it. Drop it and go to something else;" but the essayist goes further than that—he says we are going to hold command of the Mediterranean, but not because of the only possible object of our holding it—to protect our trade. We are to give up our trade, and, if so, what is the use of our fleet, except to protect Malta? We are to give up the mercantile route, and send the whole of our merchant ships, to the awful loss of this country, round the Cape, because we cannot protect the trade. If we can hold the command of the Mediterranean, we surely can protect the trade, and with coaling stations at Gibraltar, Malta, and Port Said, it seems to me the simplest thing in the world to do. I wish neither essayist had touched upon that subject. Then on the question of control—that is referred to in the essay; but I do not think I have any very fixed views on the subject. There was a time when I thought the Navy should take more control of the fixed defences, but I am bound to say it was just this: I considered that it might be possible for the Navy to take control of the fixed defences, that they would not exaggerate, and that they would take care that the money was spent in the most economical way possible for the defences, giving to fixed defences no more than was wanted, and giving to the movable defences all the rest; but I am bound to say, so much has the air cleared, and so far have we advanced towards accurate notions of how the Empire is to be defended, that I have changed a great deal, and I feel myself more ready to leave the fixed defence money in the hands of the Army. I see that all sides of the Army desire, and clearly desire, to understand the naval view and to work with it, and my belief is, that if the Army and Navy draw together thoroughly well, in the end we shall not dispute, and we shall not want to put fixed defences into the hands of the Navy.

Major BRIDGE: The points of discussion which have been raised by the two naval essays may be whittled down to this one question, a question which is exciting at the present moment national attention. This question really is, "Who ought to be responsible for the maritime defence of this Empire, including the defence of its naval bases and commercial ports?" In examining closely the arguments brought forward in both essays on this cardinal question, although there is a divergence of opinion, they almost arrive at the same conclusion, the prize essay stating that our military and naval forces should be under one Minister, and Lieutenant Hyde Smith's stating that our naval bases and commercial ports should be under the control of the Naval Administration. Now in the discussion of this subject, on which our very existence as a nation may depend, it is necessary that this subject be discussed without bias, and in the most impartial manner, and thus try to arrive at a solution which will carry us triumphantly through in the day of trial. To do this successfully all personal and selfish feelings must be set aside, vested interests must not be allowed to hamper or blind the mind, but whatever seems best and wisest for the national weal should be done. For the last fifty years or more, the

knowledge that England solely owes her predominating position among the nation of the earth to her maritime supremacy had been fading from the minds of the English people, but, fortunately, quite recently England has awoke to the fact that it is necessary to put her house in order; and as she is, *par excellence*, the naval nation of the world, the feeling that seems to be now growing in this country is, if we can judge by articles in the daily Press, in magazines, in pamphlets, and in the tone of discussions in this theatre, and in other places, that it is the birth-right of the Admiralty to have control of everything in connection with the maritime defence of this Empire. And watching the increasing growth of this public feeling, and if one gauges it correctly, the general views in the prize essay seem to be vanishing, whilst the views on this subject which are expressed in Lieutenant Hyde Smith's essay, would seem to be the views fast gaining ground; and also it is presumed that they may be regarded as the views of the coming naval school, who in the natural course of events will soon be in a position to give them effect. Now, in the prize essay, to summarize shortly, the arguments advanced against the Admiralty having control of our naval bases are two. The first argument is, that if the Navy were intrusted with the control of our naval bases, the Navy would probably find itself forced to act on the defensive. The second argument advanced is virtually this, that the responsibility would be so great that the Navy could not cope with it. Are these arguments in accordance with the recognized canons of the art of war, that the control of the base and the advanced force should be in separate hands? Do these ideas represent the best traditions of the English Navy? Can it be supposed that such ideas were accepted by the naval heroes who have helped to make England what she is? By substituting the word Admiralty for Navy, I say designedly Admiralty, I hope I may be able to show you a way how to dispose of these arguments, and also how the Admiralty may be able to take up the duty of being alone responsible for the maritime defence of this great Empire. Now it is assumed that to garrison our maritime fortresses, coaling stations, &c., 40,000 troops are required: well then, let the War Office turn over these 40,000 troops bodily (artillery, infantry, engineers, &c.), with their Officers to the Admiralty, placing at their head some distinguished soldier, who would have a seat at the Board of Admiralty. Now, if this plan were carried out, you would virtually have what is so strongly recommended in both essays, and also you would do away with what nearly all home and foreign critics of our national defences condemn so strongly. By the plan I have mentioned you would have—1st, the whole maritime defence of this Empire would be under one Minister; 2nd, dual control in maritime defence would actually be at an end; 3rd, all naval bases would be probably armed with guns, gun carriages, &c., of naval pattern, and the troops who garrisoned these would be instructed in naval gun drill. All this would be of great importance, as ships-of-war have only a limited carrying capacity, and after any naval action, it is only reasonable to suppose that guns would be disabled, ammunition, &c., would be required, casualties would have to be filled up. Now if Malta, Hong Kong, Halifax, &c., &c., were under the Admiralty control, all these requisites would be at hand, and our ships-of-war having these means at their disposal in distant waters, might prevent at a critical moment a national disaster. Now in both essays the Marines have been mentioned in a very handsome way, Lieutenant Hyde Smith especially drawing out a scheme for their employment, a scheme which will meet with wide satisfaction. In the prize essay the author says that Marines are perfectly competent to perform any duty they may be called on to do, and that they would make excellent garrisons; but in the same breath, for what seems an untenable reason, he relegates them to a lot of small stations, where they would have the same position and status as the Marines at Ascension now have. Although the author may seem to speak on this point *ex cathedra*, and to be more conversant with the wants, aims, and views of the Marines, who are about one-fourth the fighting strength of the naval forces of this country, than any Marine could be supposed to be, it is only natural to think that if this scheme should be carried out, it might prove injurious to the Marines, and prejudicial to Imperial interests, for the places mentioned in the prize essay are only smaller links in that chain of posts which the foresight and wisdom of our forefathers gained for England, as bases for our Royal and Mercantile Navies. In the prize

essay a place has been assigned to the Marines in the defence of this Empire where Marines will have to share all the toils, hardships, privations, &c., incidental to all other defenders of this Empire; in justice then might not a place be assigned where they might hope to gain the highest rewards and recompenses that a grateful country has in her power to bestow on those of her sons who acquit themselves well in responsible positions in days of trial and danger? The proudest boast of the Marines is that they are an integral portion of the Navy; they are sister Services, but the rôle of Cinderella is not a rôle that many care to play.¹

Mr. LAIRD CLOWES: It appears to me that we shall never properly understand the problem of the maritime defence of Great Britain, unless we insist upon regarding it as our ancestors regarded it. What was their view? They arrogated to themselves the proud dominion of the narrow seas. From a very early period, they considered that the sea, right up to the coasts of France and Holland—for there was then, I suppose, no three-mile limit—formed part of the patrimony of the King of England: and they consistently enforced that claim, by making foreigners in those waters strike their flags and lower their topsails. Now we do not want to re-establish "the honour of the flag"; but, on the other hand, we do not want to abate one jot of the substantial part of our claim to the dominion of the narrow seas. Unless those seas be in our hands, our position is endangered, and if they be in our hands, it is our manifest duty to protect the furthest borders of them. We are a sea Power, and our territorial boundaries are set, not where our cliffs fall into somebody else's waves, but where the other fellow's mud flats discolour our waves. In peace-time we don't interfere much with trespassers; but in war-time we shall, I suspect, be very rightly jealous of violations of our domains by improper persons; and if we have an enlightened administration, all its efforts will be focussed upon the great business of preserving a real sway over the narrow seas, right up to the enemy's territorial limits. That, I take it, will be the general plan of the next naval war—so far as Great Britain itself is concerned. The object will, I admit, be very difficult to attain; but, unless we move on those lines, we shall surrender half the natural and acquired advantages that we possess. Accepting this view, we find that the problem before us cannot be solved by the erection of great fortresses on our shores; for our shores constitute only the centre or "keep" of our Empire. What we need is defences on the very limits of our borders, defences which shall prevent the enemy from violating even the outskirts of our dominions. Land defences are for us a last resource: and recurrence to them implies that we are already upon the point of collapse. Offensive defence is the only kind of defence that would be willingly contemplated by a strong Power; and that kind of defence must be made upon the borders and not in the heart of the realm. I agree, however, that when we have done all that needs doing at sea, we may prudently turn our attention to the improvement of our land defences. All this leads up to considerations of a more practical kind. How are we to prevent infractions of our maritime territory? The obvious answer is: "By having a strong Navy"; and that is a very good answer, but it is not a sufficient one. As was pointed out here on Wednesday last, during the discussion on my lecture, we may expect that at the very beginning of hostilities, the enemy will attempt to send out torpedo-flotillas, which will not merely trespass on our territory at sea, but will endeavour to raid our great ports and destroy the ships in them. The possession of a strong, an overwhelmingly strong, Navy will never in itself render impossible this kind of thing. First of all, you cannot hope to effectively blockade all the enemy's ports within a few hours of the outbreak of war, even if you have a fleet ten times as large as you have now. Secondly, you may watch a port with a fleet as carefully as you like, but something will be sure to escape you. What we really want, then, to supplement the strong Navy is something which shall be more mobile than a fleet of battle-ships and cruisers; and which, nevertheless, shall do at least some of the duty of such a fleet, until the fleet can be sent to the spot. We want also something which, besides being quicker of application than a fleet, shall, even when the fleet arrives, assist it,

¹ It ought to be understood that the Marines have no dislike of garrisoning distant stations, but, if they do so, these Marine garrisons should start on a proper basis, and some good stations ought to be included.

if necessary, in more effectually preventing the invasion by the enemy of our maritime territory. Now I venture to think that we can find what we need in a class of very fast vessels of a type that is at present unrepresented in our Service: I mean 23- or 24-knot ships, kept ready for instant service, and so fitted that they may at once proceed off an enemy's ports, and there simply sow the water with mines. That, I think, ought to be our first object upon the outbreak of war, namely, to keep the enemy from coming out in any form, until we are ready to meet and beat him. To attain this we should have ships prepared to go and drop overboard large numbers of mines very rapidly. Of course mines will not seal up a place for long: but they will seal it up until our fleets can get before it; and, when the fleet is there, the enemy will, I suspect, be more welcome out than in. I venture to think that the designing of a fast and large craft for this special object deserves the attentive consideration of naval architects and torpedo Officers.

General Sir W. JERVOIS: Bearing in mind the observations made by Admiral Long that any discussions here or any opinions that would require a change of organization are not likely to be attended to by the British public, especially on the eve of a general election, I think it better, considering the views I have before expressed in this Institution, not to trouble you with any remarks.

The CHAIRMAN (Admiral Sir VESEY HAMILTON): Ladies and gentlemen, as Chairman I have a few remarks to make, and I will begin by saying that we all of us appreciate very much the labours of the two writers of these essays, which do them every credit, although there are points on which we disagree with them. I agree thoroughly with Admiral Salmon when he points out the deficiency of men to take over the submarine mines. Years ago, when that subject was first mooted, my opinion was that our taking over the submarine mines was out of the question, for the simple reason that, in the event of war, every seaman we can obtain is required on our naval frontier, that is, on the enemy's coast line. The men could not be there employed in active offence if they are employed in laying down submarine mines, a passive defence most unlikely to be attacked. Although perhaps we might do it better than the Royal Engineers, still they have done it sufficiently well. There is another point to which our attention has been called, and I am sorry that Colonel Moody and Major Bridge have gone, that is, to the Marines garrisoning certain ports. As has been pointed out by Sir Nowell Salmon, the Governor is Commander-in-Chief of the military forces, and if the Marines are placed in garrison in lieu of troops, is the Governor going to allow those men to leave the garrison if an emergency arises? We all look out for our own duty first; I therefore would deprecate strongly anything in the shape of a bone of contention between the Governor and the Admiral, which would be the case if they had co-ordinate authority over the Marines. The Admiral's work at sea, diplomatic and political, is sufficiently important to occupy the whole of his thoughts and attention. With regard to the Falkland Islands, I agree with Commander Sullivan. It is, as he says, the only piece of British territory from Sierra Leone round to the Canadian and Pacific coasts, the only piece of British territory at which we could make a naval station between Ascension and British Columbia. The intention of the Government is eventually to alter the commands, and to place South America under one Admiral on both sides: so that the Falkland Islands would be in the centre of his station, and he would have no great distance to go on either side; whereas at present his base is at Vancouver, which is too far off. That is the real reason for it. At the present moment all our warlike stores and ammunition are on an old wooden frigate in the neutral port of Coquimbo, a most inconvenient arrangement. Major Clarke remarked on the great expenditure involved in the proposals in the prize essay. Of course we all feel it is so, and it comes to this, are we going to lock up in 21 home stations and 41 foreign 175 torpedo-boats, forgetting the old adage that "Unity is strength, and dispersion is weakness"? You can only afford to disperse your force in the presence of a defeated foe. There is another favourite phrase, "Steam has bridged the Channel," which, in conjunction with "our fleets decoyed away," has cost the country millions of money, and the writer of the prize essay appears to me, as many others have done, to have misapplied it. It has done so for the stronger, not the weaker, maritime Power. I

should like to supplement the remarks that have been made on the subject of invasion. Admiral Colomb has pointed out in his work on "Naval Warfare" that Prince Metternich asked Napoleon in 1810 if he seriously contemplated the invasion of England in 1805, and whether the Boulogne army was not really meant for the Continent. Napoleon replied: "You are right. Never would I have been such a fool as to make a descent upon England unless indeed a revolution had taken place there." It must further be remembered that the Directory in 1797 offered him a force of 270,000 men to invade England. Napoleon went thoroughly into the matter, and, after visiting many seaports and collecting evidence, came back and made this report: "It is too doubtful a chance; I will not hazard on such a throw the fate of France." In 1805 the chances were still less in his favour, and [ascertained when at the Admiralty, from documents drawn out by the late Mr. Primrose, whose untimely death is a great loss, that at that time we could have concentrated in the Channel 60 ships of the line, 16 smaller line-of-battle ships, and 50 gun-ships, and over 120 frigates and sloops, besides gunboats; forces very far greater than the 70 ships of the line that Napoleon said would be necessary to obtain command of the Channel.¹ That is a fact, and Captain Mahan has shown in his work that historians are frequently at sea when they are discussing naval matters, and "their influence on history." There is another curious thing I came across the other day. In the old Saxon Chronicles we read that King Offa, in 755, protected this country against Charlemagne by his fleet, leaving to his successors this useful lesson, "He who will be secure on land must be supreme at sea"; so that this is no new doctrine. We go back to Saxon days, and perhaps to the Ancient Briton. "His successors neglected the Navy, and sought only to fortify their cities, a fatal mistake, for by thus permitting the enemy to land without interruption, small bodies of Danes, whom they might easily have cut off in detail, united themselves into irresistible armies." We come to the whole pith of the subject in the Saxon Chronicles of the 8th century. Another point that the essayist has altogether overlooked is the scarcity of Officers. In looking over the Navy List I find that in the Russian War, 1854-56, including Lieutenants, Mates, Masters, and Second Masters, we had 1,225 Officers employed out of a total of 1,842. At the present moment we have 1,108 Lieutenants, Sub-Lieutenants, Staff Captain Commanders, and Navigating Lieutenants, of whom 1,054 are employed, leaving a reserve of 54, totally insufficient for the wants of this great commercial country, even in peace-time, let alone in war-time. It must, moreover, be remembered that in that war we were in alliance with France, which you may say added one-third to our naval force, so that in reality we should have required 1,600 Officers at that time had we been at war single-handed with Russia, and that only for fighting purposes, for our commerce was never molested on the high seas during the whole of that war, which we can hardly expect in the future. At that time in the Russian War we had 77,000 British sailors and marines, and probably 33,000 French allies; we have now 74,000 men. It is extraordinary in the beginning of wars how rapidly our naval scale of men runs up. It is not generally known, I think, either by historians or by statesmen, that several years previous to the Russian War our annual force was 39,000, and we ran up to 77,000 in the two years war. In 1755, at the beginning of the Seven Years War, we had in commission 23 line-of-battle ships, 57 frigates, and 12,000 seamen. In 1756 we had increased our force in commission line-of-battle ships to 88 and our frigates to 110, and the seamen and marines were increased to 50,000. In 1760, four years afterwards, we had 115 line-of-battle ships, 186 frigates, and a naval force of 70,000 seamen and marines. Then we come to the war with our North American Colonies in 1775, when we had 18,000 seamen and marines and 31 line-of-battle ships and 71 frigates in commission. In 1780 we had 110 line-of-battle ships, 254

¹ Since this discussion I find in Bourrienne's "Memoirs of Napoleon," chapters 33 and 36, he never intended to invade England. His threats were to divert "attention from the real motive of his hostile preparation, which was to invade Germany and repulse the Russian troops which had begun their march towards Austria. Such was the true object of Napoleon's last journey to Boulogne," vol. 2, p. 337.

frigates, and 85,000 men; while in 1783 we had 110,000 seamen and marines and over 400 men-of-war in commission, and yet were overmatched by France, Spain, and Holland. Those increases are very startling. In those days, when a seaman went on board ship he very soon learned the simple gunnery. Now we must have trained men; you cannot do without them. At that time we had 110,000 seamen. I do not know what size the Army was: probably three or four times as great, and this out of a population of only 10 or 12 millions. In the Revolutionary War we commenced with 16,000 men and left off with 145,000, besides over 100 hired vessels, and we issued during those 20 years 10,000 letters of marque, so that we had an immense force of privateers as well. In fact, the naval force was almost incalculable, and yet we sustained a loss of 200,000,000*l.* of property by capture on the seas. There is one point on which I must very strongly differ, that is, where the essayist proposed to put our local naval defence under the order of Generals. In what I am saying I hope no one will accuse me of disrespect to the Army, but I should at once give a decided opinion upon that as most highly inexpedient. In 1885, when I was employed in organizing the defences round the coast, I was told on high authority that it was intended to place the local naval forces at each port under the orders of a General. My answer was, "You do not mean to say the Admiralty are going to stultify themselves in this way, that if an enemy attacks Holyhead, where we have no force, you are not going instantly to telegraph to the senior naval Officer in the Bristol Channel and at Liverpool (where local naval forces were to have been stationed) to concentrate upon the enemy." One General is responsible for Liverpool, and he won't let that force go; another is responsible for the Bristol Channel, and he won't let that force go; and the result would be that there would be a correspondence between the War Office and the Admiralty and the Generals, and by the time that was over, Holyhead would have been destroyed and the enemy escaped. In such a case the strong naval Officer would snap his fingers at the General, and the weak one would shelter himself under the General's orders. We cannot too strongly resist any attempt to place the Navy on its own element under the orders of the military, and as the military would do if it was proposed to place those on shore under the Navy; we never have been, and I hope we never may be. The British Navy has never yet been under the command of any foreign Officer, except on one lamentable occasion, when the French Navy being under the General, the General forced the Navy to attack Sebastopol; we were obliged to follow in the tail of the French, and a pretty mess we made of it. Sir Lothian Nicholson, who had been in the Crimea, was of another way of thinking on that point. I said, "Which Navy rendered the greatest service to the Army in the Crimea?" Beyond all doubt," he said, "the British." I replied, "Yes, you got from a hearty co-operation, what you would never have got from a sullen obedience to those we do not consider competent to command us." With regard to all these little petty attacks of our enemies, how are they to get to the places named? At the present moment there is not a French vessel that can get out to Tonkin or a Russian vessel that can get out to Vladivostock without the English coaling stations. Lay an embargo on issues of coal, and you would effectually stop them. Major Bridge suggests that 40,000 men should be turned over from the Army to the Navy with a General Commanding, who should have a seat at the Board. Speaking for myself, I strongly object to a mayor of the palace, as he would be on military matters. The Board of Admiralty is the responsible board for naval operations, and I think the Army should have no voice in it. I will wind up by quoting from an excellent article in the "Quarterly Review" of April last: "The only cheap Navy that England can have is one sufficient to defend her."

Friday, May 20, 1892.

MAJOR-GENERAL LORD METHUEN, C.B., C.M.G., Commanding
Home District, in the Chair.

THE LATE WAR GAME IN THE OPEN.

By Major E. SATTERTHWAITE, 2nd V.B. the Queen's Own (Royal West
Kent Regiment).

TOWARDS the end of February there assembled at the village of Ockley, near Leith Hill, a party of 38 Officers, members of the Home District Tactical and War Game Society. The party consisted of 9 Regulars, 5 Militiamen, 1 Yeoman, and 23 Volunteers, and among them were represented almost all branches of the Service—Regular cavalry, artillery, engineers, and infantry, Yeomanry cavalry, and Volunteer artillery and infantry; among them, also, were Officers who had made a special study of signalling, machine-guns, mounted infantry, cyclists, and transport.

The object of the assemblage was a somewhat novel one in this country, the practice of a continuous series of tactical exercises or war games in the open country. Various methods of acquiring tactical knowledge in peace-time have been practised—manœuvring with troops, war games on the map, the study of campaigns from books and lectures, and to these must be added the war game in the open. Until lately the practice of such exercises has been confined to military educational centres and to isolated days' work initiated by the various tactical associations.

While the object of the instruction was chiefly tactical, the director of the exercise, Lieutenant-Colonel W. W. M. Smith, R.A., D.A.A.G. for Instruction, Home District, was anxious incidentally to make the excursion more or less an object-lesson in the strategy best calculated to repel an invader; and it would seem desirable to reproduce his views on the subject, which are as follows:—

“The country we operated in was tolerably typical of the main lines of advance of an invader on London from the south. We were within sight of the more open country, both of the North and of the South Downs, and in between them lay the habitual closely-intersected country of the south of England; the larger area gently undulating, but lifted up into huge relief in one corner by the big features of Leith Hill.

“I can only conceive in general terms of, at the outside, three

alternative strategics, which can be looked on as at all efficient in our country; because the pure defensive, in even the very best positions, is regarded as absurd if not ruinous; and, indeed, the purely defensive occupation of positions, assisted by the local small-scale counter-attack, is only one shade better.

"We are therefore restricted to the following:—

"(i.) To occupy carefully-selected defensive positions, situated so as to cover important strategic points where such exist, and to wait the attack of the enemy in case he is kind enough to run his head against our brick wall. To do this to any purpose involves the use of the counter-attack on the largest possible scale (*à la* Von der Goltz), and is an operation most difficult to execute practically.

"(ii.) To use a position of similar type as a pivot for offensive operations on a large scale directed against the enemy's flank whenever he shall have committed himself to an advance beyond the rayon of the position.

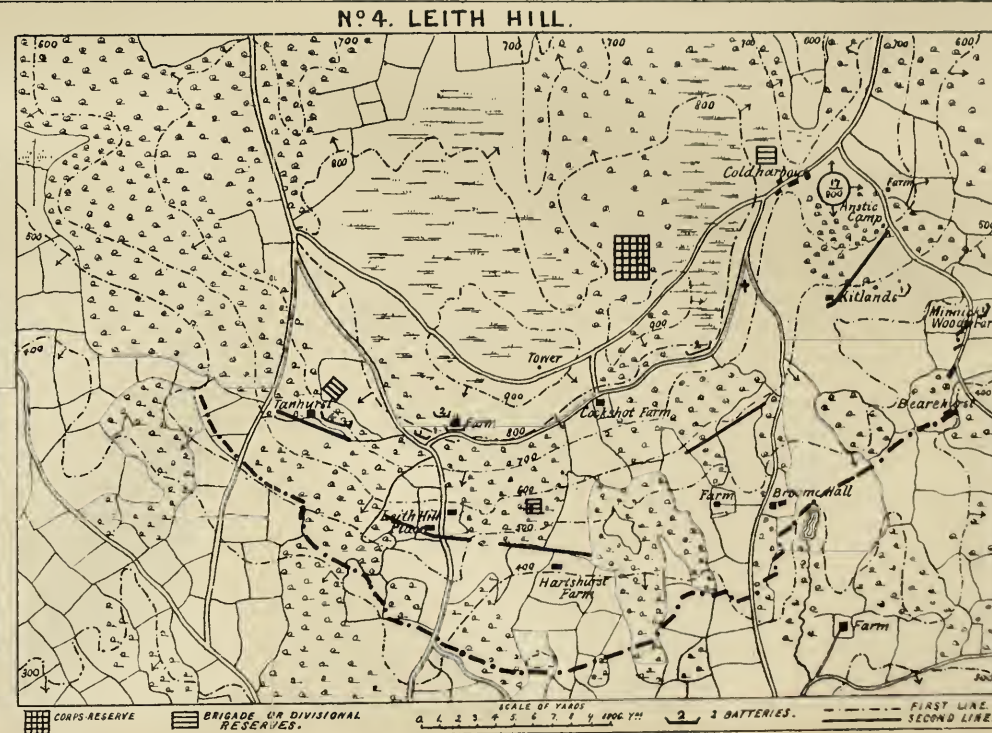
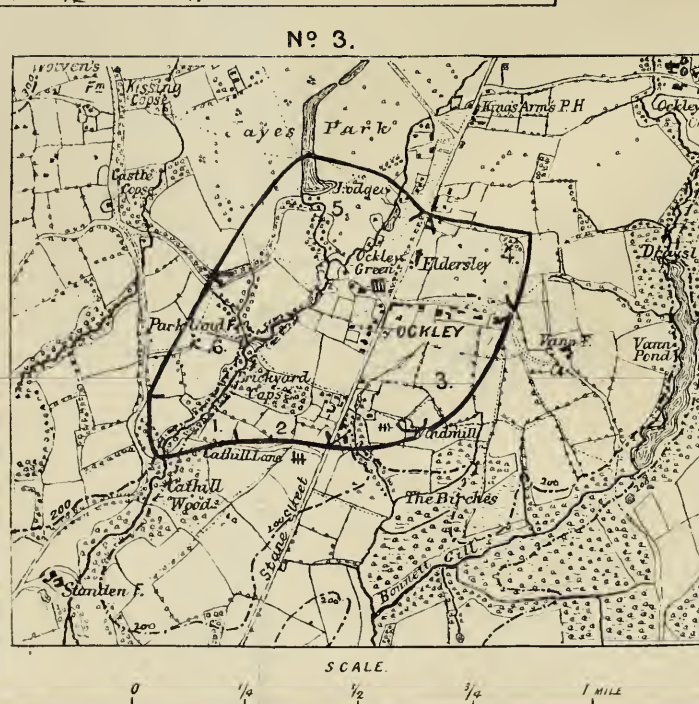
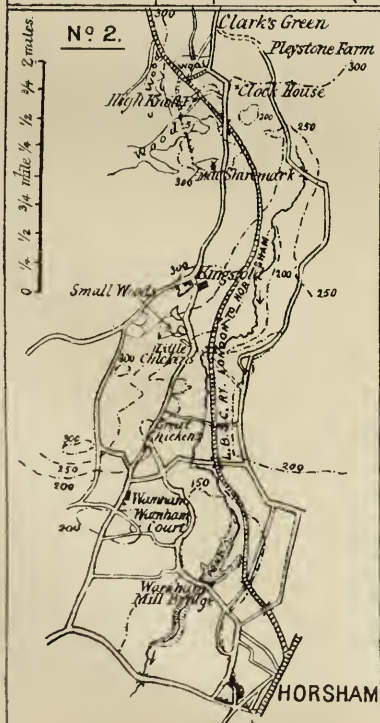
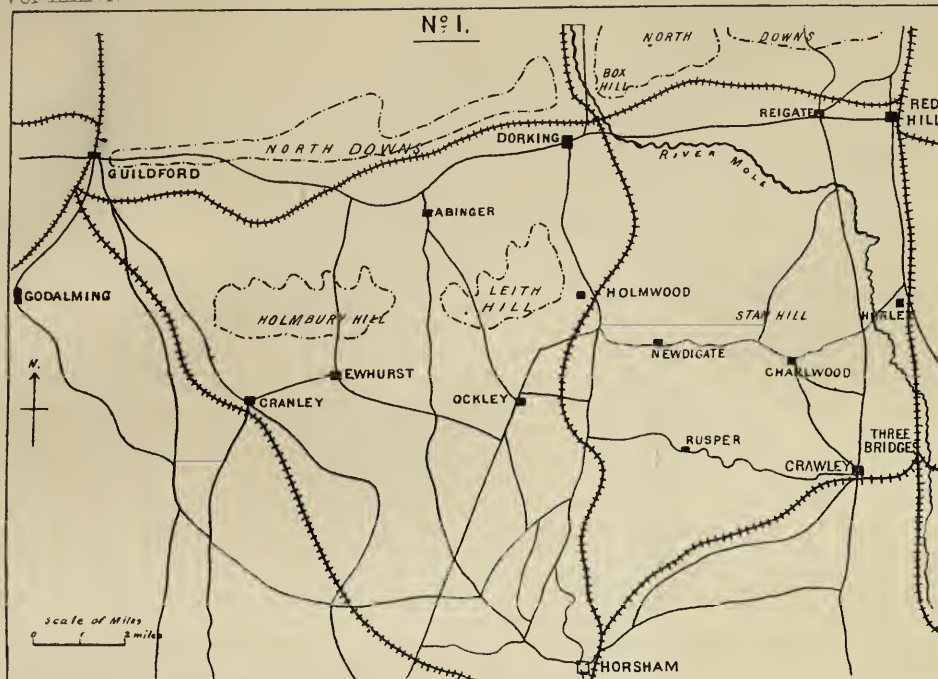
"(iii.) The offensive pure and simple, *i.e.*, to seek him out under conditions in which you are nearly certain to fall on some larger or smaller detachment of his in greatly superior numbers.

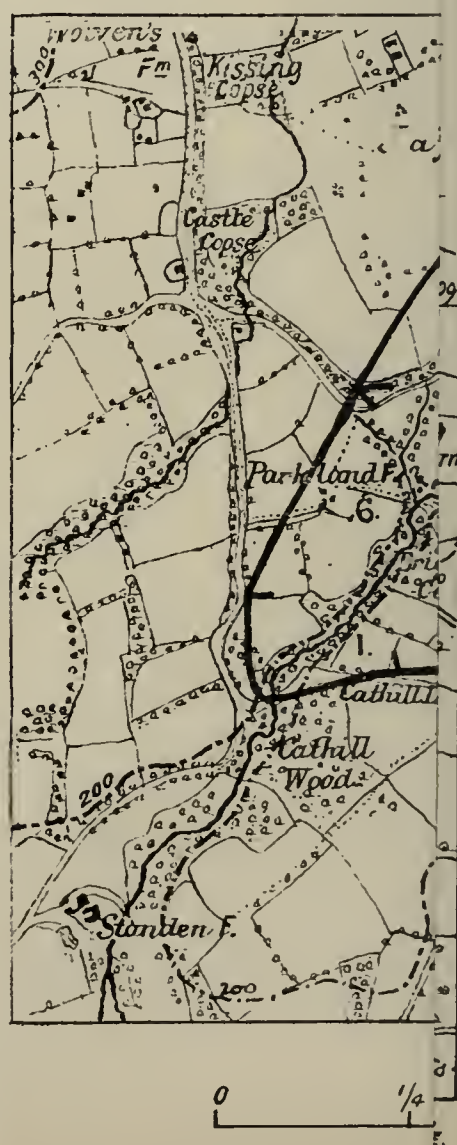
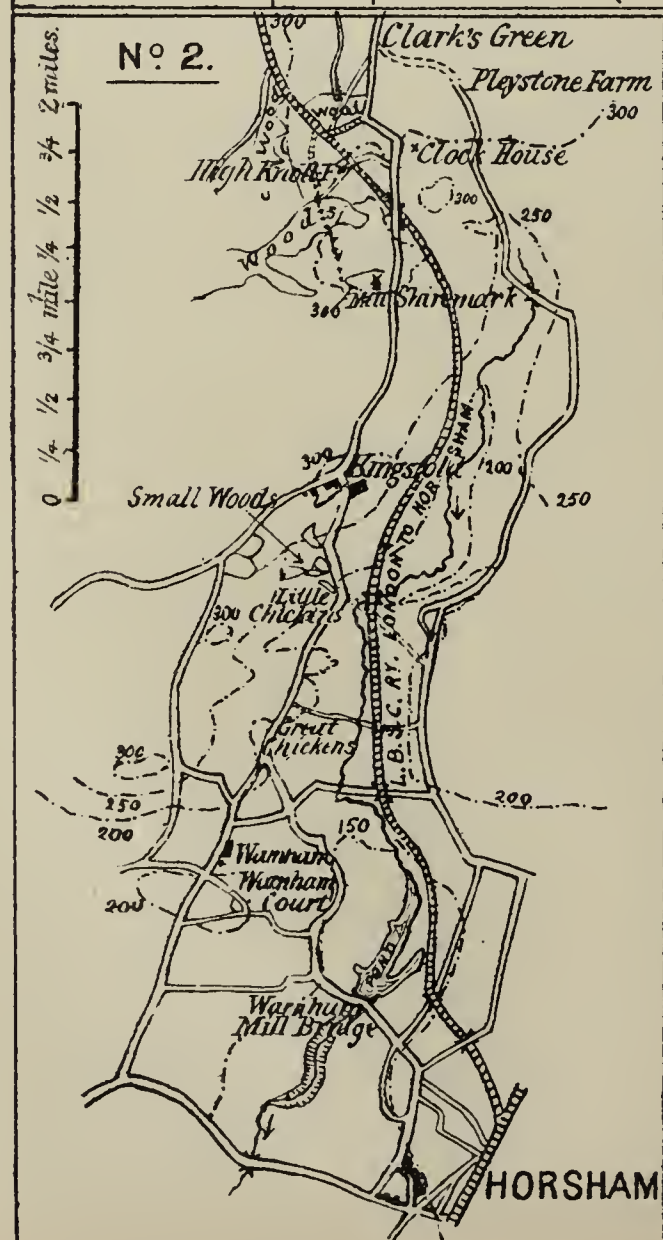
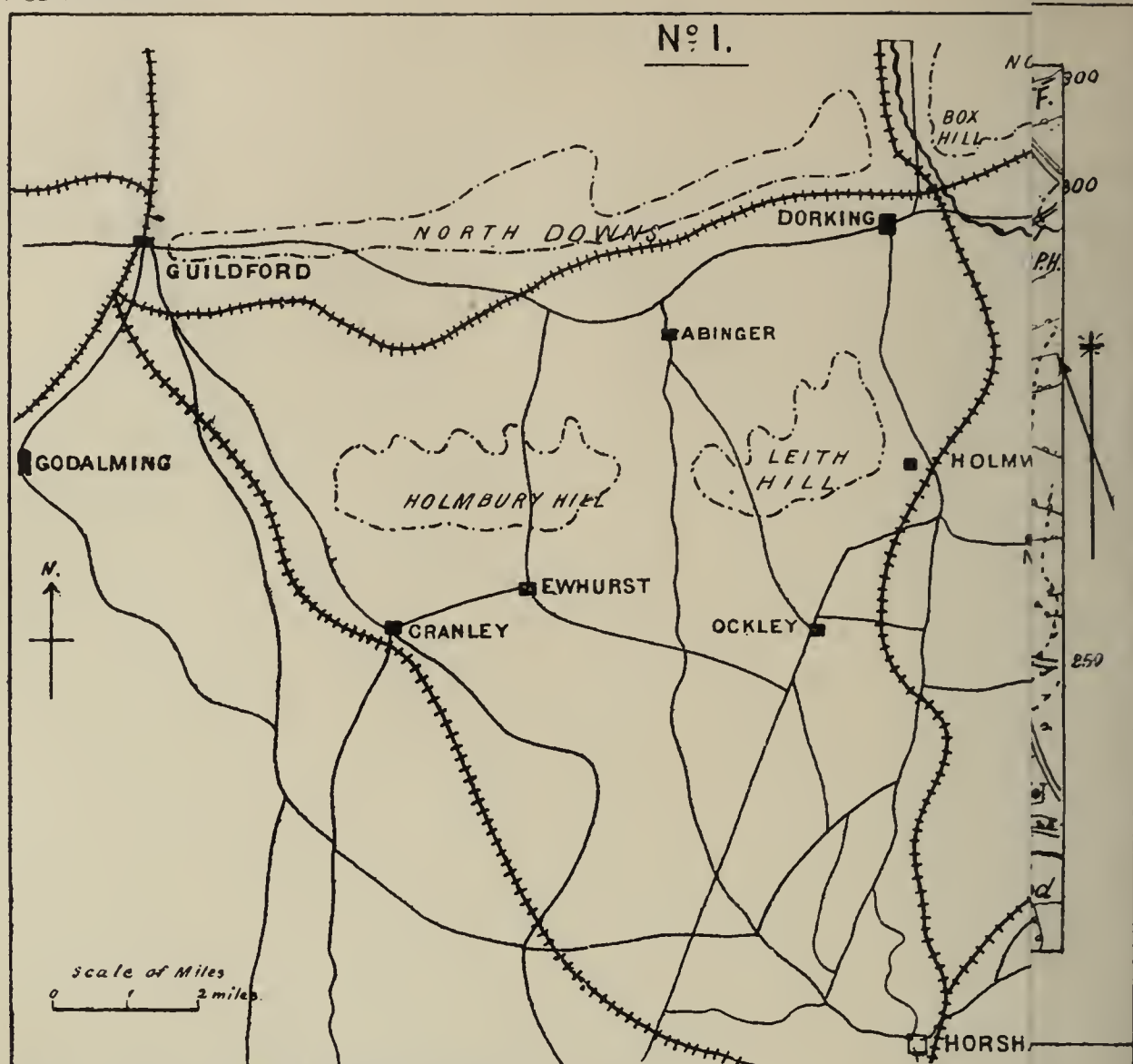
"Now, with reference to these alternative principles of actions: the first presupposes a certain amount of complaisance, not to say fatuity, on the part of the enemy in falling into your plans; and even if he does, the smallest error in designing your big counter-attack, or some unforeseen obstacle may entirely upset your calculations.

"The second scheme is not a radically unsound one, as I think we successfully made out in our march from Holmwood to the Brighton-Reigate roads. At the same time it presents its chances of failure; and these chances are considerable when the cross-roads are few, tortuous, and in bad condition. Unfortunately, the cross-roads within a rayon of 50 miles round London usually are defective in these very points. Hence there is a great deal to be said in favour of taking up a defensive position no further south than the North Downs; since the surface of the great chalk ridge presents very superior lateral communications over which we could move large forces to fall on the flank of a too rash enemy. This, however, involves a large and, I think, unnecessary delay, and exposes a large territory to the enemy's depredations.

"Hence I think we may infer from our experiments, and that not very indirectly, that the third course is the proper one to take. The enemy's dissemination to east and west in the northward advance of, say, two or three army corps must, under existing conditions, be much wider than is usually supposed, if all his impedimenta are taken into account. That is, his battle-frontage while actually advancing through Sussex must be an excessive one for the purposes of meeting a determined attack, and the difficulties of intercommunication between his several columns on separate roads must be much increased by the close nature of the country.

"Hence I advocate going for him in greatly superior strength on some one or two lines of my own selection, having nearly a certainty, if my subsidiary operations are well designed and worked out, of





inflicting a decisive defeat on some one or two of his advancing columns. I hold it as incontestable that such a check must bring his whole advance everywhere to a standstill or to a retreat.

"Then the question arises, Does the rapidity of our mobilization give grounds for hope that we could collect our forces in sufficient time to strike that blow before he reaches the foot of the North Downs? If you measure the time he must take to prepare for his invasion, to cross the Channel, to seize unguarded spots and then to disembark stores and men enough to enable him to move: add to this the actual time spent in marching northwards delayed by small parties, and you will agree with me that the time should be ample.

"Consider in connection with this our first day's operations: the country, in the number, the convergency, and the merit of the roads, was highly advantageous to the enemy's advance. No one can question but that the small force I operated with could have reduced his 15 miles march to one of 5 miles or even less. I cannot pursue the subject further for want of time, but I think the moral is easily drawn:—

"1. Delay tactics should be constantly studied and rehearsed on actual ground and in the war game in England, and with the very slenderest forces. The 'pioneer' movement must be developed to the utmost, and especially by the mounted services.

"2. The tactical and moral attitude of the strategic offensive and of the actual attack must be inculcated in season and out of season, and incessantly practised.

"3. Bad marching on the part of any battalion must be considered a crime.

"4. Advanced guard distances in our own country must be somewhat reduced.

"5. Above all, the enemy must never be allowed to grasp either the strategic or the tactical initiative even for a single moment, and least of all in the 'combat de rencontre.'"

Tactically the four days' operations were based on one general idea, and with a view to eliciting criticism on the past and suggestions for future work, I propose to give a short description of each day's work and its method of execution.

The scheme for each day was printed by the Society, as also a seniority list of the Officers; on the evening before each day's work, a copy of the scheme was issued to all concerned with one of the lists, each Officer's task being marked opposite his name, and a complete list of Officers and their duties posted at the headquarters of the expedition, the Red Lion, Ockley.

The general idea was as follows:—

HOME DISTRICT TACTICAL AND WAR GAME SOCIETY.

Scheme of Operations for Tactical Exercises in the Open Air for February, 1892.

GENERAL IDEA, v. PLAN 1.

The Invader has landed in considerable force on the Brighton—Shoreham Coast, has surprised the Shoreham Fort, and is engaged in disembarking Stores and Supplies in the Shoreham Basin.

He is at the same time advancing in force towards the North Downs by several roads. Whether Guildford, Dorking, or Reigate is his immediate objective is not as yet apparent. He appears to have in front of every column a vigorous, though not a numerous cavalry.

Another considerable force (probably $1\frac{1}{2}$ Army Corps), which has effected a landing at Rye and Hastings, is pushing (apparently) on Sevenoaks; and its advanced parties have just seized Tunbridge Wells.

The British Army is assembling behind the North Downs between the rivers Wey and Medway, so as to cover London.

The special idea issued on the night of the 25th for the work of February 26th was as follows: the subject of the day's Tactical Instruction being the "Rear Guard."

SPECIAL IDEA ; v. PLAN 2.

February 26th.

Rendezvous, HORSHAM STATION, 9.50 a.m.

The Enemy appears to be advancing on a broad front and by every available road.

The Advanced Guard of one column occupies part of Horsham by nightfall on the 25th, with his advanced posts, the Northern outskirts of the Town being still held by the Rear Guard of British troops withdrawing on Dorking.

From

THE LIEUT.-GENERAL,
Commanding 1st Army Corps assembling on Leith Hill.
To

BRIG.-GENERAL A——.
Commanding Rear Guard on Horsham—Dorking Road.

Corps Headquarters, ABINGER,
3 p.m., 25th February, 1892.

There appears little doubt but that you have in your front a whole Corps of the Enemy, headed by a Brigade of Cavalry.

It is my intention to maintain the Leith Hill position at any cost, pending the arrival of the 2nd Army Corps, expected to arrive in line before daybreak on the 2nd March.

Should the Enemy in your front resume his advance to-morrow, you will continue to withdraw in the direction of Dorking, delaying him stiffly, but not in such manner as to expose your force to demoralization.

I have directed Col. B—— on your right to withdraw along the Roman Road on Ockley, which is held strongly. His left is demarcated from your right by the line Slinfold—Strood Green—and thence by the North Brook.

On the other flank Col. C—— has been directed to hold all the lanes Eastwards of the Horsham—Dorking Railway, as far North as the Clock-House, crossing at which point you will yourself become responsible for all avenues within a mile E. of the Horsham—Dorking main road.

A squadron of Cavalry, a Company of Mounted Infantry, and 6 Guns, will be placed at your disposal by 7 a.m. to-morrow; also a Company of 30 Cyclist Infantry.

Orders by BRIG.-GENERAL A——.

7 p.m., 25th February, 1892.

The latest information leads me to anticipate that the enemy is unlikely to press his advance before noon to-morrow. Major D—— will assume charge of the whole of the delay operations between the North Brook and the Broadbridge—Warnham Road. I shall myself march at the rear of the main body of the column retiring; by the direct Horsham—Capel Road. Lieut.-Colonel Smith, with the Officers of the H.D.T.S. at his disposal, will make a preliminary reconnaissance of this route,

starting at daybreak, and reporting his recommendations to me as early as possible.

The following will be the guiding principle of the day's operations. Every road or possible avenue of hostile advance to have its appropriate group. Deployments or delay will (in default of orders from Commanders on the several roads) conform as far as possible to those of the contiguous groups on either flank, but be otherwise independent. All independent action to cease at once, whenever superior orders can be obtained.

It will be seen that successive positions had to be reconnoitred for occupation by the following troops in a rear-guard fight:—

- 1 squadron of cavalry.
- 1 company of mounted infantry.
- 1 company (30) cyclist infantry.
- 1 battery of artillery.
- 1 brigade of infantry with two machine-guns.

Accordingly, on the 26th of February, the party of 29 Officers assembled at Horsham station at 9.50 A.M., and immediately moved to the outskirts of the town.

After impressing on the Officers the necessity of studying conciseness in explaining their dispositions, and laying down the principle that it was not intended to make a running fight along the whole road, but to make a determined stand about every three miles, Lieut.-Colonel Smith led the party to first rendezvous.

For each of the three proposed positions an Officer was detailed to report on each side of the road for occupation by about half a battalion; to him an assistant was appointed whose duty was to design the line and method of retreat, while to each position was assigned an Officer to choose positions for guns and machine-guns.

The first position was in rear of Warnham Pond, the second at Kingsfold, and the third at Clock-house, while an Officer (mounted) was appointed to ride to a possible fourth position at Beare Green, and report on it as a defensive position, and also a possible camping ground for the whole rear guard.

In addition to these tasks, Officers were appointed—

To arrange the order of march between positions and to draft orders in accordance.

To consider the action of mobile troops in minor delay operations between positions.

To consider the alternative of offensive action.

To consider the action of the detachment on the Warnham Road, and lastly, two Officers were appointed to consider the action of the enemy's advanced guard.

The whole party having assembled at Warnham Pond, the Officers detailed for the first position explained the proposals for their section of the defence, and took the party over the actual ground they proposed to occupy.

The dispositions were criticized by Lieutenant-Colonel Smith, and then the enemy was invited to explain his proposals for attack. He had at hand only one brigade of cavalry, his infantry advanced guard not having as yet come up. Sending one regiment to the north and west

of Horsham, he pushed his other two regiments along the railway, and so on to the left flank of the defence. The nature of the country to be traversed by this force and the amount of exposure they would be liable to were fully discussed.

The delay to the enemy at this position was calculated. Proceeding to the second position at Kingsfold, the Officers charged with designing its defence explained their proposals in a similar manner, and the whole went over the ground.

It transpired that the enemy, finding his infantry coming up, and the country very much exposed on the east of the road, had changed his line of advance near Warnham to the western side, and intended to press an infantry attack on the right or western flank of the defence.

Lunch had been sent out to this point, and during its consumption the mist, which had hitherto covered the country, lifted, and a glorious afternoon ensued.

The third position at the Clock-house afforded the enemy a perfectly screened advance up to the right flank of the defence. Placing his guns on the foremost of two hills, close to the main road, he diverted his infantry to the west. Thence, screened by the woods and wooded lanes, he would have gained and turned the defenders' right flank. Before separating for the night the officers charged with reporting on the various staff duties mentioned above gave their opinions, which were criticized by Lieutenant-Colonel Smith.

The special idea for the next day with an outline of the various Officers' tasks was then issued; the task being "The defence of a village as a supporting point in a line of preliminary resistance."

SPECIAL IDEA ; v. PLAN 3.

27th February.

Rendezvous, "RED LION," OCKLEY, 10.15 a.m.

Orders by D.A.G. to Brigadier-General A.

Headquarters : Abinger,

3 p.m. 26th February, 1892.

It is essential to gain time for the preparation of the Leith Hill position.

A preliminary advanced position has therefore been selected along the line, Lowerbreach and Pondhead Farms, Ockley Rectory, Clark's Green, which must be held at any cost till dark on the 27th.

You will hold with your Brigade the village of Ockley, converting it into a supporting point for the rest of the line, and blocking the Roman Road. Your frontal defence should embrace the south of Jayes Park on the west, and as much ground as you may find necessary for the maintenance of the village on the east. 2 Battalions of the N'th Brigade, a Battery, and half R.E. Company, will be at your disposal by 8 a.m. to-morrow, should you inform me by 6 a.m. that you require their services. Time probably available for working parties : from 3 to 6 hours from dawn.

The force employed was—

6 battalions of infantry with 2 machine-guns.

1 battery of artillery.

$\frac{1}{2}$ company R.E.

The Officers present numbered 29.

The 6 battalions were assigned sections of the defence of the village.

Three Volunteer battalions had sufficient Officers present to undertake one of these sections each, and 3 provisional battalions were formed, 1 of Militia and 2 of Volunteer Officers.

Officers were also assigned for the following duties:—

Guns and machine-guns.

Construction of field work near the Windmill.

Signalling arrangements.

Two Officers were also told off to represent the enemy, now increased to the strength of a full division.

Assembling at the Red Lion, Ockley, at 10.15 on a dull morning, the Officers were immediately taken to their positions and shown the extent of front their battalions had to occupy, and boundaries of their sections of the defence.

To No. 1 battalion was assigned the right front of the village, No. 2 prolonging to the Roman Road, for which it was held responsible.

No. 3 battalion had a difficult piece of country comprising the left front and part of the left flank.

No. 4 battalion completed the left flank and threw back on to the Roman Road by the Red Lion.

No. 5 battalion after completing the defence of the gorge of the village had 4 companies available for the protection of the right flank.

And between the left of this battalion and the right of No. 1 the space was filled by No. 6 battalion.

Battalion Commanders were ordered to send back to the Brigadier as a general reserve any companies not absolutely required for the defence of their sections.

The morning was devoted to the reconnaissance of the position, the midday rendezvous was at 1 P.M., and after lunch, the whole party started to make a tour of the village precincts.

Standing end-on to the enemy's advance and composed of small weakly-built houses, the village itself afforded few advantages for defence. At the same time the proximity of thick woods on the left and broken country in front and on the right flank, both of which would screen an enemy's advance, rendered it necessary to protect the position from attack on all sides.

Each Officer explained his proposals for the defence of his section in accordance with the time and means at his disposal, and these proposals were then and there discussed and criticized.

The following points among others claimed attention:—

The necessity of advancing the guns at first into the foremost fighting line, owing to the absence of positions on the flanks.

The avidity of Battalion Commanders to secure the two available machine-guns.

The completeness of the signalling arrangements, connecting with permanent and field wires to Leith Hill.

The construction of a four-hour blunted lunette at the windmill: its trace and profile being shown with tape.

The utilization of the lower brick-built floor of the windmill as a redut to the work, and the possibility of the speedy destruction of the upper wooden part.

The enemy then explained his proposals for the attack of the whole advanced line.

His cavalry would reconnoitre at daybreak and discover the construction of the fieldwork near the windmill.

His division would then form for attack as follows:—

Right attack: 3 battalions, 2 machine-guns, and 1 battery against Clark's Green:

Centre attack: 1 battalion, 2 machine-guns, and 2 batteries against the south of the position, especially directing fire on the Rectory and fieldwork.

Left attack: 4 battalions firstly against Pondhead Farm; this taken, they were to move east and attack Ockley from the side of Jayes Park.

The right and left attacks were to be as far as possible delivered simultaneously.

The decision arrived at was that the defence would be able to hold its own against this attack, more especially as the left attacking force in its eastward movement would expose its left flank to the heavy artillery stationed on Leith Hill.

Orders for Monday's work were then distributed, and the party separated to meet later on at the guest night of the expedition at the Red Lion. It may incidentally be mentioned that the provision of suitable quarters for so many Officers strained to the utmost the capacity of the inn and lodging-house accommodation of the village: the country gentry, however, came to the rescue, and many Officers have cause to remember their hospitality.

Alike from them and from the farmers over whose land it was necessary to pass the greatest kindness was received: and this in spite of the fact that the country side was suffering from a bitter disappointment: it had pictured to itself the peaceful invasion of the district by all the pride, pomp, and circumstance of mimic war, bands, uniforms, and blank cartridge; and in their place it saw a commonplace mufti crowd, whose principal weapons were the note-book and shooting boot.

The third day's work was the most ambitious of the four, as the special idea will show, the preparation and occupation of a strong natural position being the subject of the exercise. Senior Officers of the Volunteer force are often called on theoretically to command as large a force as a division at the war game on the map: on this occasion some idea of the extent of front a division would occupy on the defence was seen in the open field with the advantage of having the boundaries already laid down.

SPECIAL IDEA; v. PLAN 4.

29th February, 1892.

Rendezvous, ANSTIE FARM, HOLMWOOD, 10 a.m.

The troops collected behind Leith Hill suffice for the occupation of only the Eastern moiety of the whole range. The Lieut.-General in command is instructed, at all costs, to hold his ground on the ridge till the morning of the 2nd March, and to dispose his troops so as to command the Abinger Gap on the West, and the Horsham—Dorking Road on the East.

Troops available:—1 Army Corps with 2 additional Infantry Brigades. Reinforcements may arrive by dusk on the 1st March, when it is proposed to take the offensive.

The Home District Tactical Society is placed at Lieut.-Colonel Smith's disposal to assist him in designing the defence of the central section of the line.

Troops available:—2 Divisions. He is held responsible for the ground from Leith Hill Place on the West (closing the Oakley-Parkhurst Road) to the line Anstie Farm—Bearehurst on the East. He will also reconnoitre the whole front, so as to accommodate the largest possible number of guns likely to prove effective to right and left, as well as directly ahead of his own alignment. Probable time available for working parties on the defences—4 to 6 hours. All spare troops not indispensable to the main line of the defence, as well as all details employed for previous delay-action, will be sent to strengthen the General Reserve in the hands of the Lieut.-General commanding the Corps.

Boundaries:—

- | | | |
|-----------------|---|---|
| | { | WEST.—Between Parkhurst and Leith Hill Place, 500 yards W. of the latter. |
| II. DIVISION.— | | EAST.—Park Drive, W. of high road under Broom Hall leading to Residences of Mr. Cattley and others. |
| III. DIVISION.— | { | WEST.—Ditto. |
| | | EAST.—Kitt or Sheepwash stream, E. of Bearehurst. |

The Officers were distributed in the same way as before, to arrange the defence for the divisions, with their component brigades, battalions, and batteries. Their position will be seen on the diagram.

The midday rendezvous was on the heights above Coldharbour, at 1.30 p.m., and thence the party walked westward along the ridge as far as the right boundary, inspecting the proposed artillery positions as they went.

Descending and turning eastward, the infantry positions of each brigade were discussed and criticized in detail.

It was found that the Divisional Commanders were able to spare, in all, three battalions, which would be formed into a reserve brigade and placed with the remainder of the corps troops on the lateral road running behind the brow of the ridge.

The Officers representing the enemy reconnoitred the position from his point of view and selected Broome Hall as a possible objective for his attack.

Among many points of interest which arose during the day, the following may be noted:—

The difficulty of seeing the actual main roads even in winter and from a commanding elevation like Leith Hill.

The infantry first line of resistance had to be advanced far down the hill.

The policy of placing the artillery on the actual crest or on a lower level, where its fire would be less plunging.

The final day's work was based on the following special idea, the general outline of the instruction being the march to attack the flank of the enemy's advancing columns, and special attention being devoted to the details of the advanced guard movements :—

SPECIAL IDEA ; v. PLAN 5.

1st March.

Rendezvous, HOLMWOOD STATION, 9.30 a.m.

Orders, 5 p.m., 29th February, 1892.

Army Headquarters, ABINGER.

There appears now no doubt that the Enemy has suspended his march on the Leith Hill position, and is endeavouring to slip round our left to effect a junction with his Eastern Army near Reigate.

It is my purpose to advance as rapidly as possible to-morrow on Horley and Three Bridges Stations, so as either to strike his line of advance, or seize his communications, as the case may be. Some resistance from his left flanking guard may be expected on the line of Stan Hill, between Charlwood and the Mole.

No. 1 Division will advance by Ockley and Rusper on Crawley.

No. 2 Division and Army Corps troops by Holmwood Station, Newdigate, and Charlwood on Horley. The Lieut.-General will be found at the rear of the Reserve of the Advanced Guard on this line, and will be near Newdigate by about 11 a.m.

Nos. 3 and 4 Divisions are placed for to-morrow under the command of General F—, and will march by such cross road as he may direct on the left of No. 2 Division, so as to seize the Norwood and Horse-Hills Road Junction.

It will be understood that the Advanced Guard commanders will act with prompt decision, and above all things prevent the march of the main columns from being arrested by small parties of the Enemy.

The formation and action of the centre column, composed of No. 2 Division and the corps troops, formed the day's task.

Officers were detailed to act as if in command of the following troops :—

Foremost cavalry group advancing along the road.

Supporting cavalry squadron.

Van Guard.

Main Guard.

Main body.

Artillery.

Officers were also detailed to keep up communications with the right and left columns, to reconnoitre the line of the Mole, to design a camp at Stanhill, to consider the utility of quick-moving infantry, cyclists, or mounted infantry in such an advance, and to calculate the length of the column and the time its units would take to come into action against Stanhill.

Officers were also detailed to consider the action of the enemy's flank guard.

Before leaving the rendezvous, Lieutenant-Colonel Smith laid down the principle of the day's advance—the active onslaught on to the

enemy's flank—and prescribed the strength and distances of the advanced guard; these distances, under the circumstances, being somewhat less than the normal formation.

They were as follows:—

	Centre group of screen of Army Corps Squadrons.	
Flankers.	600 yards.	Flankers.
	Remainder of Army Corps Squadron.	
	400—1,000 yards.	
	{ 1 troop divisional squadron.	
	{ 1 section R.E.	
	{ 2 companies infantry.	
	{ 3 guns without wagons.	
Van Guard	{ 2 machine guns.	
	{ Remainder R.E.	
	{ 6 companies infantry.	
	{ S.A.A. carts.	
	{ Signallers.	
	400—800 yards.	
	Brigadier-General Commanding Advance Guard.	
	{ Cyclists.	
	{ 3 guns.	
	{ 1 pontoon section.	
	{ Brigade pioneers.	
Main Guard	{ 3 battalions.	
	{ S.A.A. carts.	
	{ 3 wagons.	
	{ $\frac{1}{2}$ bearer company.	
	{ $\frac{1}{4}$ telegraph battalion.	
	500—800 yards.	
	G.O.C. the division.	
	2 companies infantry.	
	2 divisional batteries.	
	Remainder of advanced guard wagons.	
	6 companies of infantry.	
	Corps artillery.	
	„ machine-guns.	
	„ battalion.	
	„ field company, R.E.	
	Brigade of infantry.	
	Signallers.	
	$\frac{1}{4}$ telegraph battalion.	
	Remainder pontoon troop.	
	„ artillery wagons.	

The length of the column would thus be about 6 miles, and would take about two hours to pass a single point.

On arrival at Newdigate it was found that the enemy had established there a small mobile force for delay purposes; its action and the attack were considered in detail.

On arrival at Cudworth, an old moated grange, it was found that the old brick bridge had been destroyed and that the road beyond, though marked as a main road on the Ordnance map, was unmetalled, grass grown heavy clay, and utterly impassable for military wheeled traffic.

The advanced guard artillery was already committed to this road, but there was ample time to divert the bulk of the artillery by Park Gate and Hales Bridge, a fresh infantry escort being improvised.

As the advance was continued the dispositions of the enemy's flanking detachments (2 battalions) and the counter movements of the advanced guard were considered in detail.

Lunch was sent out to Stanhill, and the return journey was taken by the Hales Bridge route, when the artillery Commander explained his dispositions by the new route.

At 2.30 P.M. the day's work closed, the principal points of interest having been—

The detailed advance of a cavalry advanced guard.

The distances between the units of an advanced guard in an enclosed undulating country.

The action of small delay parties and the means of overcoming them.

The necessity for reconnaissances of country roads instead of relying on Ordnance maps.

The semi-independent action of the corps artillery on a separate road.

The hasty repair of a low brick bridge.

This concludes the narrative of the different days' work; enough has probably been said to show that each day's work afforded many opportunities for the study of more or less simple tactical problems.

The 1-inch Ordnance map only was used, as being the largest scale likely to be available on active service.

To Lieutenant-Colonel Smith the initiation of the expedition was due, and to the great pains which he took in the preliminary framing of the schemes, and in the conduct of the exercise on the ground, its success must be attributed.

To him and to the Officers who have kindly helped me with the diagrams for this paper my best thanks are due.

Some suggestions for the improvement of the details of working such a series of exercises were received on the ground, and this paper is read with a view to eliciting further suggestions to the same end.

Lieutenant-Colonel W. J. ALT (22nd Middlesex Rifle Volunteers): I am sure I express the feeling of every Officer who was present at Ockley, and also of every member of the Home District Tactical and War Game Society, when I say that we owe a debt of gratitude to Colonel Smith for the trouble he has taken in initiating this out-door work, and for the success with which it has, so far, been carried out, and also to Major Satterthwaite for so ably assisting him. There can be no doubt whatever of the great value of these out-door exercises. Whenever I take my walks or rides abroad I look at the country more or less from a military point of view; but there are others, perhaps, who look at the surroundings from a more sporting aspect. I am, therefore, of opinion, that one day in the open is of more value than a whole season of war games played on the map in Westminster Hall, and I hope

Colonel Smith will be able to continue these exercises in the future, when I am sure Major Satterthwaite will be always to the fore to second him. The work this year was, to my mind, so interesting and successful, that I can hardly offer any suggestions for its improvement in the future. One question arose with regard to the season in which the work should be carried out. The weather had been very severe the week previous, and continued very threatening at times, and it is worth consideration whether it might not take place later in the year, so as to ensure better weather and longer days. It will not be surprising, in view of the part I have taken in introducing the use of machine-guns into the Army, if I say I am pleased to find the lecturer has recorded the avidity with which the battalion commanders wished to avail themselves of those weapons. You, yourself, my lord, know the use we have made of these guns with former Easter marching columns under your command, and I am of opinion that an enclosed country like England, with its accentuated features and narrow lanes, affords most frequent opportunities for the use of those weapons, and from many years' experience in working over the country between London and the Channel coast, I find nearly the whole of the south of England is more or less admirably calculated for delay actions by rear guards. You can hardly traverse 10 miles of country without finding successive positions in which an enemy's march might be checked, and where machine-guns would prove more handy and effective than artillery. The lecturer has pointed out another thing which was demonstrated, viz., the difficulty from even a dominating height, like Leith Hill, of detecting the main roads of approach, and Colonel Smith will, no doubt, tell us how difficult it was for the attacking artillery to find points from which they could bring our positions under fire. The ground was carefully studied and measured, and there were very few positions in which the enemy could bring more than one, or at most two, batteries into action against our position. The same thing was found to be more or less the case on each day's work. I again express the hope that these exercises will be continued, and that more Officers will be able to take part in them; for I look upon the work as the commencement of a new era in the study of war in this country.

Lieutenant-Colonel W. W. SMITH, D.A.A.G.: I am glad that one hiatus in Major Satterthwaite's interesting and able paper has been already in part supplied by Colonel Alt. Major Satterthwaite, with his well-known modesty, has omitted to say anything about his own work on the occasion of our outdoor exercises. Speaking for myself, I do not think I could have attempted the exercise at all, so far as my humble share in its prosecution extended, if I had not had Major Satterthwaite as a Quartermaster-General to make all the administrative arrangements for me. Many of you will hardly realize the very great amount of trouble and forethought it must have cost Major Satterthwaite and his assistant, Captain Latter, though you may in part imagine it. I happen to know that at that very time Major Satterthwaite was extremely busy, not only with his ordinary professional work, but also in matters connected with his own battalion; yet he took this very great amount of extra labour upon his shoulders, and carried it through in a way which earned universal applause amongst those Officers whose comfort was affected by it in our excursion. There are just one or two points I would crave indulgence to speak about. In those few remarks of mine which Major Satterthwaite has embodied in his lecture, of course, I was only able, in very general and somewhat delicate terms, to advert to the important problem of the defence of London. One could not, for obvious reasons, go deeply into that. I am not sure whether, in my anxiety to advocate a sound strategy, I have not said more than I intended; but, at any rate, I had a very distinct object in view, and I wish once more to strengthen the same impression. It is this—that there is no more misleading, and, therefore, injurious expression than that which we so often hear nowadays—that the traditional and nationally appropriate method of British fighting is that of the defensive. I believe we shall never make very much progress in our arrangements for fighting in this country unless we adopt that principle of fighting which every Continental Power inculcates in and out of season on its troops, at any rate in theory. We cannot be too "aggressive" in intention and practice; and unless we train, arm, educate, and prepare ourselves in every way for winning our campaigns by a bold assumption of

the initiative in our strategy, and then, subsequently, by taking the tactical offensive as well, I feel sure we shall run a risk of coming off second best in any large struggles which we may have to conduct by land against European troops on other wise equal terms. That is a point I feel very strongly about, and I only hope that the vastly superior efficacy of the offensive attitude has transpired a little, not only in my cursory comments in the field, but in the paper which has been read. One word as to the different methods of instruction that the lecturer alludes to. It seems to me that, perhaps, the most important practical question which is put in issue in the paper before us is this: What, after all, is the best method of teaching, not only civilians, but regulars, tactics in the field, getting so very few opportunities of actual field manoeuvring as we do? Ours is a particularly cramped country, and the opportunities afforded for autumn manoeuvres are, from one cause and another, indeed few and far between. We do not practise above one-tenth of the Officers in the country, and, even when they take place, we cannot take troops over enclosed and valuable ground. How then are we to learn our work? Of course, the best of all ways is by the actual handling of troops on varied ground; but that, after all, only gives instruction to a small number. The attention of the regimental Officers is almost entirely taken up with training the men, and compelling them to conform to orders; and there are only a few Senior and Staff Officers who have the privilege of applying the higher principles of tactics in manoeuvring battalions and brigades and divisions in the field. Then, again, we have the old methods of text book reading. I am not sure that, in default of other methods of learning, we have not carried this, valuable though it is up to a certain point, almost too far. I, for one, have had a good experience of it. The number of text books I have had to read, with the view of educating myself, has been considerable; and I feel sure that in nearly all of them you find one general defect—you find the contingencies and the resources of tactical science arranged in interminable categories; and the head aches, while the memory rebels, when you attempt to recall one half of them. Imagine the possible position of an Officer who has been educated in text books alone. He arrives at the field of battle. Some unexpected emergency arises. He is worried by conflicting reports; and has too little time to hunt for a decision. He has to think to himself, "In what position do I stand? I was once taught how to conduct a flank march under conditions similar to these, and I was told there were five considerations that should induce me to take a certain course, and six considerations to lead me to avoid it. Let me see which of them is the most relevant at this particular moment. Does it come under head A or head C, or what other head?—I wish I could remember my memoria-technica for that list." You can imagine the sort of mental fog which would descend on that man's reasoning powers at the very outset of his operations. That, it seems to me, is the outcome, in somewhat exaggerated terms possibly, of what will happen with a man who is a student of text books—and of text books only. Then we have the method of learning by lectures. I admit that lectures are a very admirable means of imparting instruction; but after all they present it in a somewhat indigestible shape, simply because the information they contain is so extremely condensed, and because we have not to make sufficient intellectual effort in apprehending or weighing the conclusions they purport to arrive at. Therefore, they fail to a certain extent. Then there is the kriegsspiel. The war game, as played indoors, is admirable as regards the preliminary amount of real work which the competitor has to go through before he can devise a fitting scheme. There is hardly any other method by which an Officer can so fitly, in times of peace, have a definite strategic problem put before him. When he has thought that out, and carefully written out his orders, and more especially when the first move under fire has taken place, I am not sure that the main value of the exercise has not ceased, at any rate until the time for the final critique arrives. This, especially when made, as it usually is in this district, by our friend Colonel Hale, is, I admit, of the utmost value. But it must also be conceded that the chief value of the exercise, for the most part, terminates when you arrive at the initial moves of the pieces, particularly those which are supposed to take place under fire. Then, of course, there is the study of military history, which, within its known recognized limits, is invaluable. Last of all, we come down to this method, which, I think, we in this district may claim to have been the first to

originate, and which is now under discussion. I never heard, at any rate, of instruction being carried out on similar lines elsewhere. It seems to me that this method, taken as a whole, is the most valuable of all; and partly, I suppose, for this reason—that it stimulates our imaginative powers. I think we ought to get into the way, when we are travelling about the country for business or pleasure, of taking stock of its features from the soldier's point of view. Think, for instance, of the different travellers you meet with in an ordinary railway journey! It is not difficult to infer, from their conversation, their several points of view. One man, as he looks from the window, regards the country from a sporting standpoint; amusing himself with estimating how he would take the fences as he goes along. Another will look at it simply with reference to the fertility of the soil and the rotation of crops. A third looks at the nature of the sub-soil; the cuttings give him indications of the series of geological formations; while, perhaps, a fourth considers it merely from the artist's standpoint, and its capacities for picturesque effects. I think while we get all the elements of pleasure and profit we can out of these standpoints of view, we should habituate ourselves to work all these aspects into one of equal interest and more decided utility to our profession—the analysis, as it were, of country from the soldier's point of view, and I know no way which so generates and encourages this habit of mind—one (I would remind you) particularly recommended by Sir William Napier—as this sort of exercise. With reference to the relation of topography to military science generally, there are one or two traditional upas trees against which I should like to contribute my stroke of the axe, while I am about it. There are a vast number of Officers who think a soldier cannot possibly be made without his becoming first of all a first-rate draughtsman. I am not sure that some would not say becoming an artist. I have most painful recollections of day after day spent by myself in being taught the mere pedantry of what we used to call “worming;” endeavouring to represent the slopes of a hill by means of hachures. That time seems to me to have been worse than thrown away. It tended to create in my mind, if not a disgust with my profession, at any rate with the pedantry which our superiors of that day insisted on making a stepping-stone to its higher teaching. Of course we have better methods of representing hills now, but my point is this: that those Officers who have been told they cannot learn tactics and strategy and soldiering in the field, because they are not neat draughtsmen, may put that discouragement out of their heads altogether. In the work that we did in Surrey, we hardly called upon draughtsmanship at all, and, if at any time it appeared to individual Officers desirable to elucidate their dispositions by a hasty eye sketch, it was done with ease by Officers who, in most instances, had no pretension to be artists, or to have made any special study of topography. In fact, military science does not end with topography, and I am not sure that it necessarily begins with it: and, therefore, Officers who have not the opportunity of becoming polished draughtsmen need not be afraid of attacking more advanced problems of military science. As to the future development of our method, I am anxious that our little campaign at Ockley should be looked upon as the infaney, rather than as a fair specimen of what its maturity should be. I myself learned much by my experience as to efficient ways of conducting the different stages; and I am of opinion that the system is one which is capable of a wide development. It is certainly a much more pleasant and healthy way of acquiring military knowledge than those alternatives that I have briefly mentioned or discussed. In addition, I think we could make it very much more like the war game, if that be desired, than we did upon the last occasion. Take, for instance, the study of the defence of a position. I do not see why the Home District should not pick out a select detachment of its own Officers, say ten, fifteen, or twenty. I do not see why those Officers should not put themselves in the hands of some thoroughly skilful Chief Umpire—some Officer of experience, like your lordship—and send a challenge to a representative tactical society from some different part of England, we will say to Scotland, or to Lancashire, and ask them to furnish a team of competent Officers to work out the attack of the same position. Let the two rival schemes be worked out on the same day; let the Umpire-in-Chief be aided by two assistants, acting for the two sides; and I take it the chief work of those two latter Officers would be simply this: to prevent the

competing Officers, when it fell to their turn to report their designs in detail, from bringing forward as part of their original scheme any afterthoughts which only occurred to them after they had heard related in open court the intentions of their adversaries of the moment. In that way I do not see why we should not get a very efficient idea of the attack and defence of a position, worked out by two rival teams upon the same day, and we might all find great benefit from every stage of the process. I think those are the principal points on which I was most desirous of commenting. There is, in addition, one very natural fallacy in connection with our exercise to which my attention has been called. It has been said to me by two or three Officers, "when imparting tactical instruction on the ground, you are so apt to assume that you can do what in practice could not possibly be done within the time. An Officer engaged in the exercise is so apt to say, in an airy sort of manner, 'I should demolish this wood, destroy that bridge, throw down these houses.' " That, to any one who has not seen us at our work, is a very natural objection, but I can assure you (and I ask Officers present on those occasions to bear me out in what I say) I *never* allowed a single scheme to be put forward embodying the destruction of a wood, or a bridge, or buildings, which could not actually have been done with extreme ease under the assigned conditions of time, and labour, and equipment. I think all Officers will bear me out in that statement.

Brigadier-General HAMILTON: I have listened to this lecture with great interest. I regret very much that circumstances did not permit me to take part in those proceedings last February. I have been thinking within the last fortnight very carefully over a scheme for doing something in this way, not exactly as was done on this last occasion by Colonel Smith, but I had been thinking of inviting the Officers of my own brigade, as many as could come, to try and do some skeleton tactics, that is to get out of the battalions, if possible, six or eight men to carry small flags representing the battalions and the number of the Company, and in that way to carry out some skeleton tactics. I should get one or two artillery Officers to represent the guns, and so to go through the actual work which would be done. I think that would interest all those who came out very much, because these conspicuous flags about eight feet high would show the actual position of the troops as they marched along the road, or took up their positions. That is all I wanted to say with reference to that. But there is one very important point mentioned just at the end of the lecture, and that is the necessity for reconnaissance of the country roads instead of relying on Ordnance maps. The lecturer says, "The 1-inch Ordnance only was used as being the largest scale likely to be available on active service." Of course a military reconnaissance of the whole country would be a very large affair, and it would only be undertaken by the military Government of the country, but I do think one very great want that we have is a map on about the scale of 2 inches to the mile—one inch is too small to be really useful—of the country round London especially those portions which are necessary for the defence of London. Such a map could be worked up from the Ordnance Survey which has already been made and which in the first instance would be photographed to the right scale, and the further military details could then be inserted on it by military Officers accustomed to reconnaissance work. The military features that should be shown thereon are the qualities of the roads, the nature of the bridges, &c., and if necessary the maps should be treated confidentially when issued to Officers, and no opportunity should be given for their getting out of the country. At all events that I think is a very essential necessity in the defence of the country.

Colonel CAVE: I think there cannot be a doubt of the value of exercises of this nature. The individual Officer, and especially junior Officers, decidedly learn more tactics than they can by any other method in the same time. There is, however, a great difficulty in getting Officers to instruct us as Colonel Smith did last year. I am afraid he will not be here next year. I hope his successor or some one will be found, if he cannot come himself, to give us the same kind of instruction. I think, my lord, if you will kindly bear this in mind you will greatly help us. We are in the hands of the military authorities in this respect. There is another point, not so much in connection with the exercises, but with the deduction that Colonel

Smith drew from our four days' practice, that I should like to bring before the notice of this meeting, and which is really of very great importance. Colonel Smith concluded that of all the different systems of fighting,—the defence pure and simple, the defence taken up simply with a view to a subsequent counter-attack, or the attack pure and simple, the last was decidedly the best. We have all heard from military authorities during the last year or two very much to the same effect; but Colonel Smith concludes his remarks with these important words: "Does the rapidity of our mobilization give grounds for hope that we could collect our forces in sufficient time to strike that blow before he reaches the foot of the North Downs? If you measure the time he must take to prepare for his invasion, to cross the Channel, to seize unguarded spots, and then to disembark stores and men enough to enable him to move; add to this the actual time spent in marching northwards delayed by small parties, and you will agree with me that the time *should be ample*." That, of course, begs the whole question, Is it ample? It is a matter manifestly of mobility; that is, mobilizing our forces, getting them together in all their proper proportions, with all their necessary munitions of war, and, subsequently, field mobility, so that they can move anywhere when assembled. I venture to think it is a very moot point indeed whether we are sufficiently mobile. Some few battalions of Volunteers have devised schemes of mobilization so far as their battalions are concerned and some have practised it. It is valuable even to devise a scheme, but that is not of much use unless it is practised. Anything beyond the mobilization of a battalion is very seldom or never attempted. I think, if we are to be sufficiently mobile we certainly ought to practise coming together in much larger bodies. Practically now beyond a brigade of infantry, we scarcely ever do anything in the way of really mobilizing our forces. A few brigades of infantry sometimes are brought together, but without artillery, or with a very inadequate portion of artillery and cavalry. Next, we come to the great question of mobility in the field, little or nothing is done to this end; even the Regular Forces, if I may say so with great deference, are scarcely to be called a mobile field force. We were told at the last Autumn Manœuvres that the Transport Department deserved great praise and credit. I have not the least doubt that with the very inadequate means at their disposal, they did deserve the very utmost credit. But what did they achieve? The transport available for the whole of the First Army Corps took about six weeks to move material 30 miles from Aldershot for two divisions of infantry. I think that is sufficient to show that it is desirable to call the attention of the Institution and, so far as we can, of the Authorities to the subject. If we are to be in a position to assume that independence of attack our lessons teach us, more attention must be paid to the question of mobility.

Captain KING: My lord and gentlemen: As one who happened to be present at least on one of these days at Ockley, there is only one thing I should like to mention. General Hamilton rather covered the same ground, but I do think, especially on that third day, the Thursday, the defence of Leith Hill, that had each of the battalion commanders been provided with a few small flags to mark the ground where their battalions were supposed to be stationed, it would have added very much to the simplicity of the whole manœuvres; we should then have much more realized where the men were supposed to be. Going round with Colonel Smith afterwards while he was criticizing the positions, it was difficult, standing perhaps 400 yards from the position where the battalion was supposed to be, to realize what ground the battalion commander wished to take up, and I said at the time, in a conversation with Major Satterthwaite, that it might be got over by marking the ground in some way. It is not easy when you are out in the field to realise exactly the position. An Officer raises his hand and says, "My battalion is between such and such a point;" it is rather difficult quite to understand where he meant it to be. As only a very junior member I did not quite like getting up to make that suggestion, but it seems to me that something might be done in that way. The only other thing I should like to say is this, Major Satterthwaite mentioned the hospitality of the country gentlemen around, and as one who received that hospitality, I should like to put on record how kindly we were entertained in the neighbourhood.

Major SATTERTHWAITE: I think there are very few points which have occurred

which require an answer from me. The first thing I would say is that I do not hold up this species of instruction as the *only* way to make a modern Officer. It is quite impossible to teach an Officer, or for an Officer to learn the *actual handling* of his troops by this method of instruction; he can only learn the principles by which, if once got inherent into him, he may be able to handle the troops, if he has the opportunity of doing so. With regard to the season at which these exercises took place, it is necessary to choose a season when as little damage as possible may be done to crops, and also it is necessary to choose a season that will not interfere with our summer drills. We had isolated days in the summer last year, and it was found difficult to get the Officers together. Of course it must also be remembered, whether the exercise is undertaken in the summer or winter, that it is practically necessary to use a whole day, and it is not everybody who can spare the time. Officers are very likely to be able to make arrangements to be away for two or three days where they may not be able to get away for a single day. I may mention the name of "The War Game in the Open" was not of our choosing, but it was coined by the correspondent of the "Daily News," Mr. Pearce, who was down with us and took an active interest in the work. With regard to what Colonel Smith has said about inter-society matches at this sort of kriegsspiel, I think, perhaps, it would be better to begin it rather more humbly with inter-battalion, or, possibly, inter-brigade exercises of the same sort. I do not think any of the other tactical societies in the provinces have undertaken any work of this sort; and we all know that when a great competition is announced in the papers, and is talked about in Volunteer circles, people have a good deal of diffidence in coming forward to undertake work to which they are not accustomed. And in consequence I think it would be better first for each society to initiate amongst its own ranks some such exercises between battalions, or, better still, between brigades. The points mentioned by Captain King and General Hamilton, with regard to the flags, are, in my opinion, most useful. Captain King mentioned to me on the day at Leith Hill that it would be advisable. The suggestion was duly noted, and I hope another time we shall be able to arrange something of the sort. I think also General Hamilton's suggestion with regard to the 2-inch maps with the character of the roads marked on them would be most valuable. There is nothing else for me to say, my lord, except to thank this meeting for the patience with which they have heard my somewhat dull remarks.

The CHAIRMAN (Lord METHUEN): Ladies and gentlemen, this lecture, and the discussion that has followed, has, I think the three great recommendations of a good speech: it was short, it was to the point, and all the speakers were well heard. Now, regarding the initiation that has been given to this movement of outdoor work I look upon it as very valuable and essential. I have thought ever since I came back from Germany that we in England, who have not the same opportunities of working bodies of troops as foreigners have all over the country on the Continent, should, even more than foreign Powers, make use of the *Uebung's Reise*. I think Generals of Districts might take out their senior Officers and do very much the same work done by Colonel Smith and his class last February. But I think it is open to question whether Officers who are never likely in practice to command more than companies or battalions, are not commanding in theory, forces larger than they need ever trouble themselves about. I recognize quite clearly that to do this work with a company or a battalion is not so interesting as it is with a brigade or with a division, but I think that depends very much upon the Officer who provides the scheme. I believe that a man like Colonel Smith, of his ability, with the amount of learning that he has in his head, could perfectly well give schemes for companies and battalions which would meet the purpose, but I think it is a question—I say no more—whether at war games indoors or out in the open, there are not many Officers who are not really running before they can walk, and whether in some few cases they have only a theoretical knowledge which has not the real value of the knowledge possessed by the practical Officer. Colonel Smith stated that he could quite imagine a man with all the theory in his head finding himself with no rule that will fit in. Colonel Smith can remember as well as I can remember the very remark that Verdy du Vernois made at Nachod, when he was on the top of defile so soon as the Prussians had gone through, and said, "I found that all my theories, all the rules

that I had ever read were of no assistance to me in the position in which I was placed." The result was he had to use his head. Then Colonel Smith speaks of the defensive, but I reply that the English Army in old days always used the defensive offensive. If you look at the Peninsular War no doubt we were often on the defensive, but surely no army that ever existed dropped the defensive to take up the offensive sooner than we did. And I must say wherever the English Army goes we need never have the least fear that we shall assume only the passive defensive. Allusion was made with regard to different districts organizing a system of competitions in the attack and defence of positions. I agree with the lecturer. Let us begin far more simply, let battalion Officers work against each other, or, better still, let our Brigadiers—we have General Hamilton and others who are selected with a thorough knowledge of the work—let them work against each other. There is a difficulty and expense in working out matters on a large scale which is very often fatal to good schemes. The same remark may be made with regard to Colonel Cave, who spoke on the question of mobilization. I quite admit that it is most essential for us to do all we can to make our Army mobile, but it is a question of expense and of time, and of difficulties which are really in this country almost insuperable. Colonel Smith quoted the different ways in which you can learn military work, but he dropped one, and, in my mind, one of the most essential of all; that is, walking over battle-fields. You all go to the battle-fields of 1870; but I have also been to the battle-fields of 1866, and, as far as I can make out, nobody seems to go now to what appears to my mind some of the most instructive ground to walk over, particularly if you are provided with a book which is invaluable, Kühne's "Wanderings over the Battle-field." If you take that book in your hand, if you follow the crosses marking the graves, and you see the ground where the different companies and battalions were engaged; if you go to Trautenau, to Skalitz, you will go to a lovely country; you find inns close at hand, you will be made fairly comfortable, and you will have in your hand the very best guide I know to the battle-field. I need not take up any more of your time. As I have said before, I thank Major Satterthwaite very much for his lecture, and I have also to thank all those who have taken part in the discussion. I wish, in conclusion, to say that we owe a very deep debt of gratitude to the Volunteers. You help us all. There is an amount of go and initiative about you, that makes it of great advantage for any Regular Officer to have anything to do with you. And I come back here, after being away for some years, and find the reconnaissance work, the war game, and all those schemes that we had in our minds in former times now in existence. I think the war game, carried out as it is under the able guidance of Colonel Hale, must be of immense profit to this district, and I trust if Colonel Smith is not here next year that his successor will carry out the good work that has been organized by him; and when Colonel Smith leaves this district, it will always be a pleasure to him to feel that he has initiated one of the most valuable and best schemes that have been introduced into any district in England.



Friday, May 27, 1892.

LIEUTENANT-GENERAL SIR MARTIN DILLON, K.C.B., C.S.I.,
in the Chair.

COMBINED TACTICS.

By Colonel H. M. BENGOUGH, C.B.

Introductory.

It is, I confess, with considerable diffidence that I appear before you this afternoon, and for two principal reasons. In the first place, this is the first occasion of my having the honour of addressing an audience in this theatre, and in the second place, I cannot but feel that the subject I propose to offer for your consideration is one which may be thought, perhaps, not to concern, or even, perhaps, to interest, Officers generally, and treating, as it does, of the combined action of the three arms, it may be thought to be, in some sense, beyond, or, at least, without, the strict sphere of knowledge that can be expected from an Officer of any particular arm. With regard to the first reason, I trust that I may rely somewhat on the indulgence of my audience; and for the second, I would say, that it is because I am convinced that it is possible for every Officer, to whatsoever arm he may belong, cavalry, artillery, or infantry, or of whatever rank he may be, General or Subaltern, each in his own degree, not only to interest himself advantageously in this subject, but that it is distinctly the duty of every Officer to study this subject. No doubt the study of technical details connected with each arm is impossible for any one who has not been regularly apprenticed, so to speak, to the arm; but these are not the points with which we are concerned to-day. We have to deal with the general tactical principles of the three arms, and these general tactical principles, like all great fundamental principles, are, and ever must remain, unchangeable. Therefore, it is that I can offer you no novelty. We can but follow in the track trodden by those great masters of war who have reduced to rule the principles that must govern all right tactical and strategical action. Let us consider one of these, the most important, perhaps, of all tactical principles, the principle consecrated by the genius of a Napoleon, and which, if not first enunciated by him, received from him its most complete development—I refer to the grand old principle of the concentration of a superior force at the point of attack, and the selection of that point of a vital one. This axiom is capable of almost indefinite expansion. It is true whether the superiority be that of fire or shock, of numbers or of moral: it is equally true as applied to the action of each arm taken individually as of the three arms in combination. It is exemplified in the action of attacking cavalry, where a sudden blow at a decisive point, followed up with due supports, is a recognized condition of success. It appears in the modern teaching of the concentration of artillery fire on successive points in an enemy's line, thereby obtaining a local superiority; and it stands out clearly in the principle that underlies all sound forms of infantry attack, a principle so well appreciated by that great practical soldier, General Skobelev, viz., that of a continuous accession of supports to the fighting line.

SOME may be inclined to ask to what purpose is it that I should devote myself to a study of combined tactics when I may probably never have the opportunity of commanding anything on service more important than my own squadron, company, battery, or battalion? I would say in reply, first of all, that it is impossible to foresee what may be in store for any of us in war-time. We might then have bitterly to regret the want of knowledge and experience that might have enabled us to strike an effective blow for our Queen and country; that want of skill and resource which makes itself so sadly felt when the one chance comes in a soldier's career, and probably comes not again.

In connection with this point I would quote two extracts, one from our new Infantry Drill Regulations, the other from a recent number of a Service journal. The former runs: "On service it will often happen that an Officer commanding a company who does not know the principles governing the employment of the other arms must fail to gain all the advantage possible from his own arm." And the other to the same effect: "Even junior Officers must look a little beyond their own immediate sphere if they are to be equal to the duties the eventualities of war may thrust upon them; a Subaltern has often, in our small wars especially, to show himself a General ere he is a Captain." But though we may not possibly be called on to command a mixed force ourselves in the field, we may, some of us, serve on the Staff of Generals who do, when the knowledge I am speaking of would be invaluable.

But I am well content to rest my case on the principle laid down in our new Infantry Drill above referred to, that no Officer can do full justice to his own arm without some knowledge of the working of the sister arms. And does this knowledge generally exist? I think that few will contend that it does, and that numerous examples to the contrary will arise in the memory of many of us, both in the field of war and of manœuvre. Let me quote briefly two from my own experience.

At the hapless battle of Isandhlwana a mule rocket battery accompanied Colonel Durnford's column to the field of action. On arrival, the cavalry hastened to the front; the rocket battery, left to itself, advanced to a hillock with the intention of coming into action. The hillock was lined on the far side by the enemy. On the battery topping the hill the Zulus fired a volley, killing the Officer commanding the battery and the quartermaster-sergeant. They then charged with the assegai, and none of the battery were ever seen again.

The other example I would quote is from the field of peace exercises. At a rifle meeting in India a prize was offered for a tactical field firing competition, the competing teams to consist of a company of infantry and a section of artillery; marks being specially allotted for the manner in which the tactical part of the exercise was carried out by either arm. The position to be attacked was not visible from the rendezvous, which was in a wood. The little column started with an advanced guard, the artillery being in rear of the infantry column. Shortly after debouching from the wood the position became visible.

The guns at once trotted away to some rising ground and opened fire. The infantry continued to advance and eventually formed for attack behind the same mound from which the guns had opened. From thence, without getting the range from the artillery, and without the Commander arranging on any combined action, the infantry advanced straight on the position. In doing this they soon masked the artillery fire so that the guns had to cease firing, and the assault was carried out by the infantry without any further assistance from the artillery. It is true that when the fact of the exclusion of the guns from the fight was realized the artillery Commander determined to change position, but too late to affect the issue of the day.

In the next contest the artillery avoided the error of clouding the infantry fire by taking up a first position well to the flank, but without escort, and again without any understanding with the infantry. So resolute was this artillery Commander to support his infantry closely (thus recognizing, but misapplying, the principle of co-operation) that he brought up his guns to close rifle range of the position whilst his own infantry were still at a distance, and would probably, on service, never have got into action at all.

Now here we see in a simple combined exercise of two arms, nearly every possible rule of tactics violated: guns placed in the rear of a column on the march in the presence of an enemy, no reconnaissance, no plan of attack, no artillery preparation, no escort for the guns, no ranges taken from the artillery by the infantry, no tactical support of the infantry by the artillery; and yet the Officers in command were all intelligent, and I have no doubt well versed in the drill of their own individual arm, but simply they had never been practised in working in combination with another arm.

It is common and natural for soldiers to endeavour to forecast the results that may be achieved in the next war by the introduction of some new arm or machinery, or some change in the tactical formation of one or other of the three arms. Is the next campaign to be won by an improved rifle, as Frederick's early victories were, to a great extent, due to his iron ramrods, or as the German successes over the Danes were won by their breech-loaders, or as the French hoped to annihilate the Germans in 1870 by their mitrailleuses, or is the campaign to be decided by a new formation of battle tactics, as in the case of Frederick's lines or Napoleon's columns? He would be a bold man who would offer to predict on these points; but this I think we may venture to affirm, that the Commander who in the next war succeeds in giving the most complete development to the three arms in combination will have an advantage that cannot very easily be overborne by any superiority of weapons, or of numbers, or of formation.

What, I would ask, to make use of a homely simile, would be thought of a carpenter who, when desired to make a box, and provided with, say, a chisel, hammer, and saw, should lose both time and perfection of workmanship by using one or perhaps two of his tools only instead of all three; and when it comes to a question not of boxes but of battles, is not the Commander guilty of something worse

than neglect who fails to utilize to their fullest extent all the weapons in his armoury?

And yet military history furnishes numerous instances of such neglect; indeed, it is only in the battles of the great masters of war, and not always in them, that we find examples of the full development of the use of the three arms; and in applying this experience we should remember that the perfection to which the power of offence of artillery and infantry has now been brought renders it all the more essential to give that power its full effect, for in the same ratio in which these two arms have increased in effective action do the consequences of their non-utilization react prejudicially on an army that neglects to use them. Even Napoleon, if we may dare to criticize a genius so superior to all criticism, notwithstanding the complete knowledge of the value of tactical combination that he possessed, cannot be said to have always utilized the three arms to their fullest advantage. A skilled artillerist himself, he placed a high value on the power of that arm, and consistently practised the preparation of a position by artillery fire, and the massing of guns on important points, but his cavalry was frequently squandered in a wasteful manner, or not used at important crises of a fight, and the cavalry reconnoitring service was generally imperfectly carried out. The infantry, too, was used rather as a battering ram than as an arm whose power of offence is fire. And this, notwithstanding the Napoleonic dictum, "Fire is everything, the rest is of little account"—this axiom now so often quoted was, however, I think applied by Napoleon not to infantry fire in the attack or defence of a position, but to infantry fire in resisting cavalry charges.

We must not, of course, forget the vast difference between the fire weapon, cannon or musket, of those days, and the rifled gun and magazine rifle of to-day. A century ago, 200 yards was a long range for a musket, and the effect of artillery was indeed little more than "*vox et præterea nihil*;" but this difference, though it may account for the want of development of the power of those arms in the tactics of the past, makes the combination of the three arms in the present day not less, but more, necessary; the more delicate and accurate the components of a machine, the greater the necessity for perfection in their combined action.

Reviewing the occasions, happily few, when a British force has been worsted in a fair field of battle, the cause can generally be traced to a failure in tactical combination, such, for instance, as Chillianwallah, where that gallant, but impetuous, Commander, Lord Gough, failing to employ his guns, advancing with exhausted troops against a brave enemy strongly posted, sustained a rebuff but little removed from a defeat; and again at Maiwand, where both tactics and initiative seem so unaccountably, and so little in accord with British traditions, to have passed to the side of the enemy.

The Germans, in the war of 1870, and in their teaching prior to that war, thoroughly recognized the value of the use of the three arms in conjunction, and, for the most part, during the campaign, each arm was duly utilized. Exceptions can, of course, be quoted, as,

for instance, the failure of the cavalry of the advanced guard of the VIIth Army Corps to sufficiently reconnoitre the French position at Spicheren, resulting in the Germans finding themselves committed to an attack against a superior force in a strong position, instead of having to do with a rear guard only, as General Kamecke imagined. Again, we have the inability of the cavalry to discover the extent of the French position before the battle of Gravelotte, and the misuse of that arm on the same day, when, after repeated failures by the German infantry to dislodge the mitrailleuses posted in front of the Point-du-Jour, squadrons of cavalry were uselessly hurled up the Mance ravine at these guns, entailing certain loss and ultimate failure.

Of the want of mutual support by the three arms on the French side in the same war, examples are not wanting. Witness the absence of systematic reconnoitring by the cavalry, and the slackness of the outpost duties by all arms. Co-operation by the artillery was frequently wanting, as, for example, in the many gallant counter-attacks undertaken by the French infantry against the German right at the battle of Spicheren, which, if preceded and supported by artillery fire, might have had very different results.

The reckless manner in which the cavalry arm was expended on both sides during the war points to a want of appreciation both of the value and of the duties of that arm in battle. Indeed, the cavalry seems to have been used chiefly (with some notable exceptions) in attempting to redeem an already lost battle, or in extricating Commanders from disasters into which a want of skill or foresight had plunged them.

In the American Civil War—a war waged on both sides by troops and Commanders generally but roughly instructed in war tactics—it is somewhat surprising to find that whatever strategical errors may have been committed, as a rule, full effect was given to the employment of all arms, mutual co-operation being ordinarily afforded both in battle and in bivouac. This may be due in part to the essentially practical nature of the American character, which showed itself so markedly throughout the contest, and which must have recognized the enormous advantage conferred by a system of co-operation in battle.

But to understand the proper working of an arm in combination, we ought certainly to possess some knowledge of its own special organization, capabilities, and general tactical application. All these points, putting technicalities aside, can be readily mastered by any desirous to do so. Some suggestions as to how the needful knowledge can be best acquired will be offered at the close of this lecture.

It is impossible in the time at our disposal to-day to deal fully with this part of our subject. I may, however, be permitted to sketch briefly some of the tactical characteristics of each arm, under modern conditions.

The functions, then, of cavalry, the premier arm of the Service, are, rapid movement and shock, and the duties of protection, exploration, and foraging, when mounted, and the power of fire dismounted, or rather, the former only are the functions of cavalry proper, for it

is the action of the man and horse together that constitutes the true cavalry. The dismounted action is, as it were, an adjunct, or a temporary, though necessary, departure from the cavalry rôle.

I do not propose to enter into the question of the present relative value of the cavalry arm compared with the sister arms as affected by the late progressive improvements in these latter. That its tactical value in the battle-field cannot keep pace with that of the artillery and infantry, having regard to the ever-increasing accuracy and range of firearms, is clear, inasmuch as the powers of cavalry, being limited by the natural capabilities of the man and horse, are, so to speak, a fixed quantity, whereas firearms are capable, under mechanical ingenuity, of comparatively unlimited expansion; yet the time for cavalry to cease to act effectively as a tactical agent in the battle-field is still, I believe, far distant, and even what, under the stress of modern mechanical inventions, it has lost in tactical it has more than gained in strategical importance; for the long-range fire of artillery necessitates the commencement of an action at very great distances; accuracy of fire of both artillery and infantry makes an initial blunder more difficult than ever to redeem; and smokeless powder enables an enemy to conceal his strength and position until an adversary is committed to the attack. From all this it results that reliable and early information of an enemy's dispositions and probable designs is absolutely necessary before a Commander dare commit himself to a struggle; and this places on the "eyes and ears" of the Army a duty even more important than that of shock in battle.

But if this new rôle gives to cavalry a higher strategical importance, it makes also a greater demand on the training of man and horse. Boldness, celerity, cool-headedness, and steadiness in the field will remain as necessary as ever, but superadded to these, which may be called the inherent qualities of all good cavalry, must now be added greatly increased powers of intelligence, of initiative, and of resource, and a conviction through all ranks that their efforts can be of no real use unless directed towards and subservient to the success of the other arms. Instead of this do we not frequently see cavalry at field manoeuvres engaging in desperate conflicts with the enemy's cavalry, useless because not based on the above principles?

I have said that to fulfil the rôle of modern cavalry effectively, a very different training to that to which our cavalry has been accustomed seems to be necessary. The highest individuality and intelligence of the trooper must be developed, that he may be able to see, hear, and report accurately the various incidents that come under his observation, understand his orders, and appreciate the responsibility that rests on his shoulders. Is our present training of cavalry calculated to create efficiency in these respects? I fear that few will contend that it is. That a trooper is taught to ride, and drill, and cut the sword exercise is true; but this is surely but an elementary training for a cavalry soldier, and it must be remembered that a British soldier by very virtue of his civilization is, without special training, little fitted for duties that require the exercise of the natural instincts, such as in our Cavalry Regulations are somewhat vaguely defined as

“detached duties,” viz., to find his way from point to point across country by day and night, to hang on to an enemy without being discovered, to combine the resource and finesse of a hunter with the steadiness and discipline of a trained soldier; such are some of the qualities required of good cavalry. To attain them, systematic and practical instruction of Officers and men, from the first simple duties of scouting to the higher ones of reconnaissance, is necessary.

All true cavalry soldiers will, I feel sure, have hailed with satisfaction the first great step for the practical instruction of their men that has been lately taken by the introduction of the squadron system of field training. Much is still wanted to enable the training of our cavalry for war to be efficiently carried out in England, such as a suitable ground for manœuvring, say, a cavalry Aldershot in the north of England, an increased number of horses in cavalry regiments at home and at the Canterbury dépôt.

The question of the armament and equipment of cavalry is one closely allied to its tactical employment, but it is too large a subject for us to enter on to-day. Sword, lance, carbine, pistol, and even bayonet, have all their advocates as weapons for cavalry, and there is almost an equal variety of opinions as to the best methods of carrying these weapons. It is pretty generally accepted, I think, that in view of dismounted duties being now so frequently demanded of cavalry, the best place for the sword is on the saddle, but as this leaves the trooper defenceless when separated from his horse, some weapon should undoubtedly be carried on the person when going into action.

The evil condition of a trooper thus separated from his arms scarcely requires illustration, but as a picture is often the most impressive manner of conveying a lesson, I may perhaps be permitted to quote an apt illustration of the advantage of a trooper being always ready for an emergency, in a graphic scene from Archibald Forbes’ “Experiences of the War between France and Germany.” “Just as we entered Saarbruck, two of the German Black Hussars made a dash to cross the old bridge into the town, not knowing whether there were Frenchmen over the way or not. A French piquet was in the Schloss Platz and a few of the men under a sous-officier ran down the slope to the bridge head to have a crack at the hussars. When these saw the red legs coming, they went about and rode back. Chased on to the bridge by the latter, one of the horsemen’s horses fell and threw his rider. As he lay prostrate, the French sous-officier sprang forward, his sword upraised to strike the hussar as he rose. The gallant horseman, however, was on his legs with one bound, with another quick movement he levelled his slung carbine, drew the trigger, and the sous-officier was a dead man.”

In India many methods have been tried of carrying the carbine on the person, but none have as yet, I believe, been officially adopted.

I do not propose to refer at length to the dismounted duties of cavalry, important though they are, as they still have a certain controversial aspect, and I wish to avoid subjects of controversy as much as possible. My own opinion as a layman, such as it is, has indeed

undergone a change since I have been convinced that for cavalry to perform efficiently perhaps the most important of all their duties, that is to say, the duty of forming a screen in advance of the main body, they must be able to dislodge any hostile bodies of dismounted cavalry or mounted infantry holding villages, bridge heads, defiles, &c., which would otherwise check their onward progress. I for one used to think and to maintain, as indeed is still maintained by some, that it is impossible to teach a soldier to consider himself at the same time invincible in the saddle against infantry, and equally invincible on foot with carbine in hand. But the fact is, that the idea of the invincibility of cavalry against magazine rifles must be given up. Cavalry may still have opportunities of charging broken or shaken infantry, and they may even be required on an emergency to sacrifice themselves by attacking unbroken infantry, but the question of the invincibility of cavalry when opposed to accurate, rapid, and disciplined fire of modern rifles must be abandoned for ever; though it may sound something like a paradox, the only way to ensure to cavalry that independence of movement indispensable to true cavalry action is to train them to a temporary abnegation of the true cavalry rôle.

But let us pass on to consider some of the more prominent tactical characteristics of modern field artillery.

The importance of artillery in the battle-fields of the future will, I think, be found to have increased in a greater ratio than that of any of the three arms. So vast indeed is the difference in training and matériel between the artillery of to-day, to look no further, and that of a quarter of a century ago, that it would be impossible to foretell its effect in the next campaign. It used to be said that the effect of artillery fire was principally moral; it is now no longer merely moral, or rather it is now more moral than ever, because more material.

Far ranging, accurate shooting, and quick-firing guns, high velocity shrapnel, and high explosive common shell, good time fuzes, vertical fire from field howitzers and mortars, principles of concentration of fire and of forward and enterprising tactical action, and best of all practice in accurate shooting, and training in the rapid service of guns, and in the observation and control of fire, all these measures of improvement, and I daresay others that I may have failed to notice, have given such a value to this arm that guns, and plenty of them, will now, more than ever, be an indispensable adjunct to an army that hopes for victory in the field.

But the connection of this arm with the sister arms is a very close one. Artillery is essentially an arm of co-operation. It must always, as a rule, be dependent on one of the other arms for its own close defence, although instances are not wanting, especially in the Franco-German War, of artillery repulsing by its own fire attacks of both infantry and cavalry. But the dependence of artillery on the other arms does not of itself imply the necessity for a special escort; for artillery may be tactically defended by the near presence of a formed body of either of the other arms. The following golden rule is

from an artillery Officer of experience, viz., that in the attack infantry should hold themselves responsible for the safety of artillery; whilst during a retreat artillery should stand by infantry to the last, even to the loss of their guns. United with infantry, artillery can do and dare anything. Witness the manner in which the German guns were thrust into the very firing line of infantry in 1870. This bond between the artillery and infantry is so distinctly emphasized in the German Army, that guns are forbidden to change their position without the consent of the Commander of the force to which they are attached.

But it is, after all, the infantry arm that must ever remain the great arbiter of battles; and this because of its great power of fire both in offensive and defensive action, its capability of moving over any kind of ground, and its rapidity in coming into action. But infantry are slow, very slow, in movement, and it is this very slowness which is one of the points so important for the other arms to recognize and to make allowance for.

Let us consider for a moment what are the requisites for good modern infantry. Discipline, including that most important branch of discipline, fire control in the field; good shooting, not only at a target at known ranges, but at a moving object at unknown distances, or, which is still more difficult, at an object firing at the firer; intelligent use of cover, and good marching powers: the whole cemented by that best of all soldier-like qualities, endurance. In one of these qualities, at any rate, our infantry have made great progress of late years, and in the term infantry, I would wish to be understood to include our reserve forces. I allude to fire discipline. I was present at the late Easter manœuvres at Dover, and was very much struck with the great advance made by the Volunteer regiments in this respect as compared with the last time that I saw them, some ten years ago, when the very meaning of the phrase "fire discipline" was almost unknown. This year I noticed that section commanders almost invariably named the distance and the object to be fired at, while the men fired steady volleys, and paid attention to sighting and aiming, and this amongst a mob of onlookers sufficient to unsteady the best of Regular infantry.

Whilst speaking of the tactical arms, I must not omit a reference to what may now be called the fourth estate of the military hierarchy, the mounted infantry, omitting mention of that most important auxiliary, the engineers, whose action is not strictly tactical, and therefore does not come within the scope of our subject.

This branch of the infantry arm has now, as you know, a recognized place in our military system. It has passed through many vicissitudes, and has suffered, perhaps, more from the misplaced zeal of its friends than from the sneers of its opponents. It is no theoretical novelty, but has gained its present position by right of good service in the field. The arm with which this tactical youngest son has very unjustly been put forward as a rival (I refer to the cavalry) has now accepted it as a very useful supplement and support, and, I think, even recognizes that it is to this arm that it must often trust

to ensure a fair field for the exercise of its own proper functions as cavalry.

The action of mounted infantry in its tactical aspect is identical with that of infantry. Its arm is the rifle; the horse, or may be the mule, which transports it is merely the means of its more rapid locomotion; but whether when acting as a mass of infantry brought suddenly into action on some particular and important point, or when supporting the sister arm of the cavalry, it has fully justified its claim as a recognized tactical agent.

It remains now for me to attempt to present you with a picture of the working of the three arms in union on a modern battle-field, and to close with some suggestions for attaining the objects advocated in this lecture.

Let us imagine then a force of the three arms acting on the defensive, and a similar force advancing to discover the position of the former, and, if opportunity offers, to attack it.

Let us suppose that the advancing cavalry brigade is preceding the column by a day's march, and has, shortly after starting in the morning, been checked by an unfordable river of which the further bank is held by the enemy, but apparently not in force. It is important to cross without delay, but the only bridge within 10 miles has been destroyed. A few boats are, however, procured, trees are felled, and rafts constructed from these and from material found in the nearest villages. The men have been practised in raft making and in swimming their horses, and in two hours' time a passage is effected under cover of the fire of the horse artillery and machine-guns. The cavalry pioneers and a body of mounted infantry are left to repair the bridges and to hold the passage until the arrival of the main column, whilst the cavalry press on, sending back a cyclist orderly to inform the General Commanding of what has been done. It is not long before the Officers' patrols report the presence of formed bodies of hostile cavalry, stating the approximate force and the presence or absence of guns.

Then follows some manœuvring between the two hostile cavalries resulting, let us suppose, in the attack gaining some substantial advantage, and forcing back the defending cavalry on their reserves. On following up this first success with a view to ascertain the position, strength, and intentions of the main body of the defence, a smothered report and a bright flash from a height some 2,000 yards distant, and an empty saddle or two in the cavalry column bring the brigade to a halt. It is clear that the hill is occupied, but by what arm and in what strength it is impossible to say, as there is neither report nor smoke sufficient to indicate this.

Rapid decision on the part of the cavalry Commander is demanded. Ordering the horse artillery into action on the spot, and leaving a company of mounted infantry for its protection, the cavalry brigade is retired rapidly to where some undulating ground offers shelter. From this spot reconnoitring parties are despatched, which report that ground favourable for a dismounted attack exists, leading up to a flank of the enemy. The horse artillery are recalled by signal, and

the position that they are to occupy in the attack is pointed out to the Commander. A portion of the brigade is left mounted under cover, whilst the remainder, with the machine-guns and all the mounted infantry, are moved to the flank from which it is intended to attack the post. Information of the intention to attack is sent back to the Commander of the forces, stating that the post obstructs the further advance of the cavalry and the prosecution of the reconnaissance of the enemy, and that it appears to be an isolated outpost not defended by guns, and not protected by the fire of the enemy's batteries.

The first few rounds from the horse artillery guns are replied to by machine-gun fire from the hill; but the new horse artillery gun, although shorter and lighter than that of the field batteries, and of less initial velocity, is sufficient to show the magazine-guns that they are overweighted, and they soon cease firing and are withdrawn behind the hill. The guns of the attack continue their fire on the hill from a flank where they are not masked by the now advancing dismounted troopers, whilst the machine-guns have found a similar position somewhat more advanced on the other flank. The assault is successfully carried out; the enemy, consisting of a couple of regiments of dismounted dragoons armed with carbines and bayonets, with two machine-guns, seem at first inclined to await a hand to hand encounter, but the bayonets of the mounted infantry, or the appearance of the mounted cavalry reserve moving round the hill against their rear, proves too much for them, and they run to their horses, mount, and retire in fair order, carrying off their machine-guns.

The Commander of the Force has by this time arrived on the field and directs that the captured post be held by the mounted infantry and the machine-guns, which are to entrench themselves as far as time and tools will admit.

In the meantime the reconnaissance by the cavalry is continued; this proves a matter of the greatest difficulty. Officers' patrols, under selected leaders, are sent out with directions to try and gain the enemy's flank or rear, while the brigade manœuvres in support and occupies the attention of the enemy's cavalry, which at last ventures to try conclusions by another attack; victory, through the opportune action of a flank squadron, again declares for the attacking force, and by pushing home this advantage the cavalry Commander succeeds in drawing fire from the guns of the main position, and he is thus enabled to gauge roughly the extent of ground occupied by the enemy. It is noticeable that the position of the enemy's batteries is indicated not only by the bright flashes from the guns, but by the thick clouds of dust that, owing to the sandy nature of the soil, arise at each discharge.

Sketches of all the ground under view are made, and on the return of the reconnoitring patrols a fairly complete report of the extent of the enemy's position, the position and number of the batteries, together with a description of the most favourable line of attack and of the positions suitable for artillery, is submitted to the Commander of the Force. The above report tallying with sufficient

accuracy with the observations made by the balloon section, which has managed to make an ascent by a captive balloon from near the reserve, the Commander is enabled to decide at once on his action. His intention is to threaten both flanks in force, but to make his real effort against the enemy's centre, by breaking through there and seizing the road which leads directly from this centre to the rear, and forms in fact his enemy's main line of communication.

He accordingly issues written instructions to his cavalry and artillery Commanders, pointing out personally to the latter where he wishes the guns to come into action, the line of their advance, and the exact spot on which the fire is to be concentrated for the final effort, and enjoining on the former to continue to harass the enemy, and to hang on to his cavalry, not forgetting to post Officers' patrols in rear of the position so as to gain information of the arrival of any reinforcements during the action, and to report any indications of a retreat. Similar instructions are sent back by two Officer orderlies to the Commander of the infantry column, who is informed of the intentions of the General Commanding, and is directed to advance as rapidly as possible.

The main column of field artillery and infantry had been delayed by the passage of the river alluded to, but the field batteries having crossed have pushed on at the first report of firing in front, which had been passed to the rear by cyclist orderlies posted in groups so as to maintain communication with the cavalry column, and were at this time some 8 miles distant; but horses and men have been accustomed to long and rapid marching, and so, escorted by a company of mounted infantry, the field guns cover the distance within the hour, and take up a position opposite the centre of the enemy's line of battle, obtaining the range from the horse artillery, which, having drawn the fire of the position, is now withdrawn from action.

(It may be noted that an artillery position in front of the centre has been here selected in preference to one on a flank, in accord with the opinion of Colonel von Schell, as given in his "Tactics of Field Artillery," and that of General Brialmont in his "Combat Tactics of the Three Arms," on these grounds, viz., that in a flank position the artillery is *en l'air*, covered only by the cavalry, and, though advantageously placed for taking the enemy in flank, it is itself liable to enfilade fire; whereas a frontal position facilitates the concentration of fire, is the shortest and quickest way into action, the guns are tactically protected, and a very effective fire can be directed on both wings of the enemy. The front of the batteries must, however, be kept clear of infantry until near ranges are reached.)

The mounted infantry, leaving their horses under cover, are pushed well to the front, and drive in the enemy's skirmishers, who had already begun to annoy the guns.

A steady concentrated fire directed successively on different portions of the enemy's artillery line results in partially silencing the guns, or at any rate in causing their withdrawal under cover of the reverse slope of the hill. The high-angle fire of the field howitzers and mortars on either side is somewhat disappointing. The noise of a

60-lb. shell bursting overhead is certainly found to be sufficiently alarming, but the vertical fire of the defence is wanting in accuracy, especially when directed against troops on the move, and the observation of fire on the part of the attack is found very difficult. It is, moreover, suspected that the defence have provided themselves with some species of overhead cover.

By this time the advanced guard of the main column has arrived, and the infantry battalion composing it is at once sent forward to a convenient knoll, whence a long-range fire by company volleys is kept up, in conjunction with the artillery fire, on the enemy's line of entrenchments, whilst the infantry column forms for attack. The deployment completed, the infantry advanced, covered by a light cloud of skirmishers, at first in small columns, taking advantage of the undulations of the ground. As the hostile shells begin to tell these small columns shake out into an extended line. On the enemy's rifle fire becoming felt the skirmishers in front of the line lie down and await the coming of the fighting line, which, at about 800 yards, opens with steady and deliberate volley fire. Up to this time the front of the artillery has been kept clear to allow of an uninterrupted fire being maintained, but as the infantry approach the zone of aimed rifle fire this interval is closed by a battalion from the reserve.

As the infantry advances the artillery moves to a second position, and concentrates its fire principally on the point selected for assault, but at the same time continues to occupy the enemy's attention by a fire along the whole line. When the infantry attack has progressed to within short range of the position (400 or 500 yards) some of the guns again advance and take up position at about 700 yards range, whilst the remainder continue their fire on the selected spot, firing where necessary and possible over the heads of the fighting line. When this no longer can be safely done the artillery direct their fire on the enemy's reserves, whilst the artillery Commander, with a portion of his batteries, holds himself in readiness to advance with the infantry on to the position itself. The attack suffers much from the absence of smoke cover, and the power of accurate concentration of fire is found barely to counterbalance this disadvantage. The Commander of the Force is in direct communication with the Officers commanding brigades of all arms by means of signals, heliographic or flag, or perhaps telephonic, and is kept informed by cavalry and by captive balloon reports of any changes in the dispositions of the enemy. A counter-attack undertaken against one of the flanks is, thanks to the timely information thus afforded, met and repulsed.

The time for a decisive movement is approaching; every weapon is directed on the spot destined for assault. Guns, machine-guns, and magazine rifles all combine to pour in a continuous storm of lead. The reserves are held in readiness to strengthen the assaulting line. The cavalry is already hovering around the enemy's rear. A fire, still well sustained, is returned from the trenches; the crisis cannot last. The Commander, who has kept his finger on the pulse of the fight, recognizes that the moment for the

supreme effort has come ; the reserves advance in a steady line, with bayonets fixed, the bands playing the regimental quick-step ; the sound of the old familiar airs is borne to the fighting line ; every man nerves himself for the coming struggle ; the whistles sound, the firing ceases, and, as if by one impulse, the human wave surges forwards, is checked here and there for a moment, and then a hoarse British cheer announces that the position is won.

The capture of the key of the position does not, however, in itself mean complete victory ; the three arms are still required in combination to guard against a counter-attack, to complete the success won, to press the pursuit.

Whilst the infantry reserves and the guns that have accompanied the infantry at the assault prepare from their point of vantage to sweep the enemy's line on both flanks, the cavalry have forged their way to the rear of the position, and a resolute and opportune charge on the flank of the enemy's reserves at the moment of their advancing to succour the now disorganized line suffices to break their *morale*, and paralyse their attack ; nothing is now wanting but a vigorous pursuit.

The above sketch may serve, however imperfectly, to illustrate the manner in which the three arms act and react on each other in a modern battle-field, and may thus assist to emphasize the necessity which it is the object of this lecture to enforce, that each arm should learn in peace-time how to support, how to co-operate with, its sister arm in war.

And I would ask is this necessity sufficiently recognized ; is there any real harmony of action, or even sympathy of feeling, between the several arms in our Service ; what is the aspect with which not only the rank and file, but Officers generally, of the several arms regard the tactical working of the other arms ? I can attempt to describe it only from the infantry standpoint. But Officers of the other arms will, I think, find no difficulty in filling in a similar picture from their own point of view.

Does not an infantryman then regard the tactical value of cavalry with an air of disdainful superiority bordering on contempt, and accept them as allies, as fine and gallant fellows, whose appearance and dash enliven the field of action, but contribute little towards the victory ? Is not the feeling that prompts the infantry, as I have seen at manœuvres, to order arms and stand at ease when a cavalry charge is being executed, a true indication of the want of tactical touch between the arms ? It is no doubt desirable that an infantry soldier should regard his own arm as invincible, but it is pressing this principle a little too far when he comes to despise his own cavalry ; and as regards the artillery, the rattle of the guns has certainly always an inspiring effect on infantry in action ; but does this feeling arise, as it should do, from an appreciation of the mutual relationship and dependence that really exists between these arms ? I fear not.

And why then this want of confidence, this absence of touch ? The cause is not far to seek. It comes simply from want of mutual

knowledge of each other, from want of practice in working together; and how is this knowledge to be gained? I would offer one or two suggestions on this point before I conclude.

1st. By self-instruction, that is by reading and observation.

2nd. By instruction from superior Officers. Commanding Officers should be able to instruct those under them in the general tactics of the other arms, in so far as they affect their own arms; General Officers might initiate and encourage lectures on the subject, and might when possible cause two or more arms to be associated together in minor tactical exercises.

3rd. By the war game.

4th. By attaching Officers of one arm temporarily to another arm.

5th. By making a knowledge of the practical tactics of the three arms indispensable for promotion to field rank.

On each of these points a few words. I have mentioned reading and observation as two important means of acquiring the sought-for knowledge. Nearly every account of a modern battle if given truthfully and in detail abounds with instances of the application or neglect of this principle; a number of such instances stored up in the mind will form a basis for action when the opportunity presents itself in the field, and as to observation, any field day will afford lessons enough to an attentive observer.

As regards the instruction of Officers by Commanding Officers, I can well remember the form of instruction that was in vogue when I was a Subaltern. My regiment was fortunate in possessing as a Commanding Officer one of the smartest drills and, indeed, best soldiers in the Service. But the drill mania was at its height. All Officers were summoned once a week to the orderly room, and put through a catechism consisting mainly of subtle and intricate questions on the evolutions of drill as they then existed. That it required a quick and ready memory to describe offhand a movement involving almost geometrical accuracy is certain, and so, no doubt, the examination was in a sort of way a test of an Officer's knowledge of his drill book, though even here book knowledge and the power of applying that knowledge in the field are of course two very different things; but was not the whole thing a sad waste of time and of mental energy, whereas the kind of instruction here advocated is, or should be made, both interesting and practical?

Regarding this question of lectures, I was rather amused to see in one of our Service journals lately somewhat divergent opinions expressed. A correspondent, writing of the French Army, noticed the great extension that has been given in that army to the system of lecturing by Officers of all grades. A correspondent, in another column, protested rather warmly against the abuse of lecturing, as he considered it, in our Service. I certainly was not myself aware that we had run riot in this matter of lecturing. In some thirty-six years' service I cannot remember having had the opportunity of listening to half a dozen lectures, excepting those delivered in this hall. At the same time I sympathize so far with our over-lectured

correspondent as to say that I don't advocate lectures being given merely for the sake of lecturing; no one cares about being lectured over much, whether from behind a curtain or elsewhere, and less so in this age, perhaps, than ever, but I think that all lectures should have some obviously practical object, whether tactical or otherwise.

3rd. The war game is undoubtedly a useful accessory in the acquirement of a knowledge of combined tactics. And here I would venture to offer my congratulations to the society known as the Home District Tactical and War Game Society, for the excellent work done by them in this direction for some years past. Their published records alone show how much valuable instruction, how much interest, can be evolved from the war game when the exercises are carried out in a practical spirit, and under skilful and experienced guidance. Those exercises are especially useful in exemplifying the action of the three arms where field practices are necessarily impracticable.

4th. The practice of attaching Officers of one arm temporarily to another arm has been tried in India, but not, I think, with conspicuous success. It has been left entirely to Officers to ask to be so attached, and we all in these matters require a little encouragement, not to say gentle pressure. General Owen, R.A., told us in this theatre, some three years ago, that in Belgium every infantry regiment is required to send a Captain to attend for fourteen days the artillery gun practice, and as there are seven of these courses annually, each regiment has seven Captains instructed every year, and he adds that the instruction was considered most valuable, as enabling the infantry Officer to appreciate the progress in artillery. I believe that our infantry Officers occasionally attend the practice camps at Okehampton and Shoeburyness, which is all in the right direction, but I think that the idea might be much extended. General Owen, in his lecture just referred to, also remarks to this effect, as follows :—

“It is sometimes said by Officers of other arms that artillery Officers endeavour to make a mystery of their arm, and this complaint has been echoed even by some artillery Officers. I have seen little to justify such a complaint. The details of gun and ammunition are rather complicated in these days, but it is hardly necessary for Generals or other Officers to master these. All they want is to know—what the fire of guns can do under various circumstances, the spaces batteries occupy in different formations, with a general idea of their tactics. To obtain the first it would be wise to give General and Staff, as well as other infantry and cavalry Officers, when practicable, the opportunity of visiting Okehampton, Shoeburyness, and other gunnery schools, and observe the practice there; and these Officers might make valuable suggestions respecting the positions of targets representing troops and in other matters.”

5th. As regards the last of my proposals, viz., that of an examination in combined tactics for promotion to field rank, perhaps few will thank me for suggesting any addition to the present tale of bricks in the way of examinations; but the kind of examination here

cated is not one of books or papers, but a test of the knowledge of tactical principles and their application by a practical examination in the field, such as indeed is now carried out throughout India for all grades, and has been endorsed with the approval of even the examinees. Troops may or may not be employed, but an Officer is required to show on the ground how he would dispose a force of the three arms under certain suppositions, as, *e.g.*, an advanced or rear guard, a line of outposts, in defence of a position, &c.

There is still one more suggestion that I should like to make. It is one that was made to me yesterday in my journey from York, by an Officer with whom I was discussing this subject. It is a suggestion that has often presented itself to me, and, I have no doubt, to many of you, but it unfortunately involves a considerable initial outlay. It is simply the massing of troops of the three arms at certain tactical centres, instead of dispersing isolated units all over the country. This dispersion of regiments and batteries at small out-of-the-way places no doubt originated when railways were few and communication difficult, and telegraphs unknown, and was, I suppose, necessary in case of serious civil disturbance; but, with our present complete system of communication by rail, road, and wire, the necessity for such dispersion no longer exists. Its effect on higher military training is very prejudicial. How can a field battery, for instance, stationed at Exeter learn anything of its real duties in the battle-field? How can a cavalry regiment at Leeds fit itself for war service? How can an Officer who has never seen the three arms together, except, perhaps, at occasional manœuvres, and who finds himself in command of a mixed force in the field, do justice to himself or to his command?

No doubt but that any radical change in the quartering of troops in the United Kingdom would entail great expense, but much might, I think, be done by a gradual change without any overwhelming cost, and the object is one worth paying for, touching as it does so closely the war efficiency of our Army. What I have said as regards home applies with almost equal force to India, and could be there more easily carried into effect.

In conclusion, I would say that I shall feel well rewarded for the time given to this lecture if the points that I have had the honour to bring to your notice this afternoon should give rise to a useful discussion here, and to a thoughtful consideration of the subject afterwards.

Lieutenant-General Sir MARTIN DILLON: General Bengough's lecture is very interesting; it would be difficult to over-estimate the value of such lectures in preparing the mind for the field. Our Officers are exceedingly good, but labour under great disadvantages. Our organization hardly admits of the practical instruction of those who have field rank in moving the three arms, if, indeed, more than a battalion of two or three hundred men should be within their reach, before they succeed to the command of their regiment. Aldershot is the one place where troops are in sufficient number for the instruction of the superior Officers. The Curragh also, but at a certain period only, for whereas the battalions abroad are supplied from the oldest of our young soldiers, the effectives remaining are few indeed,

and they are absorbed in musketry training and in fatigue duties. Officers from the Staff College and those from regiments have passed through my hands—both classes equally defective in power, because without that practice which gives confidence. Practice is absolutely indispensable to fit them to handle the troops entrusted to them when acting under their seniors, and essentially for independent commands. Our own military literature is very limited in extent. Such a lecture as we have had the advantage of hearing goes far to supply that deficiency. I would gladly see General Bengough's suggestion carried into effect. I am sure that I but speak the sentiments of those who are present in offering him our best thanks for his paper.

FOREIGN SECTION.

THIS portion of the Number, hitherto the Occasional Notes, has now become the Foreign Section, and is reserved for articles, either original or compiled, on professional subjects connected with Foreign Naval and Military matters; also for notices of Professional Books, either Foreign or English.

The Council of the Institution wish that this section shall be developed still further, and I have undertaken to continue my Editorship during the current year, with a view of aiding them in carrying out this work. It seems to me possible to make this section, and consequently the Journal, the means of keeping our Members acquainted with all naval and military progress abroad *pari passu* with that progress; and I shall be glad to receive from members of both Services, including in the latter those of the Auxiliary Forces, suggestions, information, or offers of assistance.

It is desirable, further, that I should state that, as regards editing the Naval matter in the Section, I shall have the aid of Naval Officers, thoroughly competent to give good advice and to pronounce sound opinions.

It must, however, be borne in mind that, as the change from a quarterly to a monthly issue has been made in order to ensure the more prompt publication of the Lectures after their delivery than has hitherto been the case, the Foreign Section will, as a rule, be restricted in extent during the Lecture season in the first half of the year, and will be prominent in the second half.

It is requested that communications and books for review (the latter under cover to the Librarian) may be addressed to me at the Royal United Service Institution, Whitehall Yard, London, S.W.

LONSDALE HALE,

Colonel R.E. ret.

PRÉCIS OF THE INSTRUCTIONS FOR GUNNERY AND TORPEDO SCHOOL-SHIPS OF THE ITALIAN NAVY.

Translated from the "Giornale Militare per la Marina" by Commander H. GARBETT.

General Regulations.—The Gunnery School is established for the training of ordinary and higher-grade (*lit.*, picked) gunners, and also to complete the instruction of gunner-armourers and the non-higher-grade men, in order to afford them the opportunity of qualifying themselves for promotion.

The object of the school is to impart special instruction in military and technical subjects, and, in a minor degree, as far as the circumstances will permit, instruction in seamanship and the general education of the men are to be carried on.

A ship in the Reserve is to be used for the purposes of a school-ship, and she will be stationed at one of the seaports which is the headquarters of a naval command. There will be attached to her as tenders—

1. A vessel of the 2nd or 3rd class also in the Reserve, which, as far as possible, is to be armed with a full complement of guns of medium and light calibre; the final or supplementary course is to take place on board this vessel, from which also the target practice for both the ordinary and supplementary courses is to be carried out.

2. A tug in commission armed with small calibre and quick-firing guns.

3. Four steam pinnaces for ship's service and for exercise, and one for each tender.

The personnel and qualification of the Instructing Staff have been settled by the Royal Decree of the 4th June, 1891.

During the school course no changes are to take place among the Officers or Instructors; as far as possible they will be appointed for not less than a year, and only half will be changed at one time.

The school is placed directly under the command of the Senior Officer on the station; and all communications relative to the pupils and discipline of the school are transmitted to the Minister of Marine through the Senior Officer. With regard to the course of instruction and the carrying out of the studies and experiments of any kind, communications are carried on direct with the President of the Permanent Commission. The work on board the school-ship is carried on quite independently of the other ships and division of seamen in the harbour; moreover, she cannot take over the duties of Senior Officer or flag-ship.

All the regulations of the Navy are to be complied with on board the school-ship, so far as they do not clash with the present rules or

the special work of the ship. There are two ordinary courses yearly on board the school-ship, and two supplementary courses on board the tenders.

The first-named are intended for the instruction of gunners and the higher-grade men classed as skilled gunners. The second are intended to complete the education of other men, by affording them opportunities for qualifying for advancement to higher grades. Senior petty officers may also join in the final courses as ordinary scholars, in order to make themselves conversant with the new weapons.

The ordinary courses, which begin on the 1st of March and the 1st of September, last five months: the one month's interval between them is intended for repairs or any necessary work on board the ship.

The supplementary courses begin on the 16th of August and the 16th of February, and last four months.

During the month which precedes the beginning of a course, the men under orders for the course may be embarked upon the school-ship or tender, in order to receive their first instruction in seamanship. All the pupils must be on board for the beginning of each course, and, after it has commenced, no additional scholars can be embarked except by an order of the Minister.

The Instruction Board of the school-ship consists of the Commandant as President, the Seconds in Command of the ship and tender, and a Lieutenant-Commander as Secretary.

This Council is summoned by the Commandant to give their opinion on all matters which may arise in regard to the instructions; moreover, they have to compile the military instructions, and the annual recommendations as to changes to be made in the advancement rolls of the gunners. If the Commandant thinks fit, he can add one or more Officers to the Council for consultative purposes.

The Commandant nominates a special Commission to carry out investigations and experiments in all that concerns gunnery matters, which may be submitted to them by the Minister of Marine or the President of the Permanent Commission. All new instructions and changes must first be practically tested and approved by the Council, and for this purpose the Lieutenant-Commanders in charge of divisions are to be taken into consultation. The text of such compiled instructions and changes in the same are then to be transmitted to the President of the Permanent Commission.

Duties of the Personnel.—In addition to his duties as Captain of a ship, the Commandant of the school-ship, has the supreme supervision of and responsibility for the instruction of the men embarked on board the school-ship and tender, as well as for all experiments, trials, &c., which may have to be carried out.

The frigate Captain, Second in Command of the school-ship, in addition to his duties in that position, has special charge of the instruction and drills of both the ordinary and supplementary courses.

The corvette Captain, in charge of the general details of the ship, is responsible for the cleanliness and ordinary duties of the ship, and

that all matériel is kept in good condition. Under ordinary circumstances he has nothing to do with either the instruction or experiments, although in case of sickness or absence of the Second Commandant he performs his duties.

The Lieutenant-Commander who acts as Secretary of the Council is appointed for the purpose by the Minister of Marine; he has as his assistant one of the Sub-Lieutenants embarked for general duty on board the ship. Four Lieutenant-Commanders are entrusted with the instruction, superintendence and maintenance of discipline of the four divisions into which the men undergoing instruction in the ordinary course are divided; a fifth is embarked on board the tender, and performs the same duties for the men undergoing the supplementary course.

In addition to their duties in charge of divisions, the Lieutenant Commanders of the school-ship are on duty in turn for twenty-four hours as Officers of the day, and during that time are responsible for the carrying on of the ordinary duties of the ship. The Lieutenant-Commander of the tender has charge of all the gunnery and electrical stores.

All five are responsible for the general muster lists, punishment returns, and general register of the target and judging distance practices; a petty officer is told off to act as writer for each of these Officers.

To each division is attached a Sub-Lieutenant of the school-ship. These Officers are under the orders of the Divisional Commanders, attend all the drills and instructions of their men, are free from watch duties, but are on general duty for twenty-four hours in turn. The Sub-Lieutenants of the tender have the same duties to perform.

Four Sub-Lieutenants from the Seamen's Corps in barracks are also attached to the divisions, and perform similar duties to the above.

Four subordinate Officers from the Seamen's Corps keep watch-duties on board under the Officers of the day. Each of these Officers has, in accordance with the regulations for ships in commission, charge of a portion of the ship, and also the superintendence of a division of the regular crew of the ship.

The corvette Captain, Second in Command of the tender, has similar duties as the Second in Command of a ship whose Captain is absent on duty; he is under the immediate order of the Commandant of the school-ship. He superintends, subject to the Second in Command of the school-ship, the instruction of the supplementary course and the target practice of the ordinary course, which takes place from the tender.

The Chief Medical Officer of the school-ship has, in addition to his ordinary duties, the instruction of the men in affording first aid to the wounded.

The Commandant of the school has the power of selecting the petty officer and gunnery instructors from among the instructors of the preceding course, and from those petty officers who have passed through the supplementary course. He can, moreover, propose to the Commander of the Seamen's Corps that gunner petty officers attached

to the corps or detachments in port, who display special aptitude for the work, be embarked as instructors for the school. The petty officers instructors, in addition to their share of the instruction, will have to perform the duties which fall to them on board ordinary ships in commission. The school Commandant will recommend to the corps Commandant, at the end of the course to be marked first for promotion, such petty officers who may show themselves particularly industrious and meritorious in the performance of their duties; provided they stand for seniority among the first third of their grade. The gunner petty officers detailed as under-instructors and those gunners selected as assistants are chosen by the Commandant, and are subject to the same regulations for duties and recommendation for promotion as given above.

The superior petty officers for quartermaster and deck duties, who are embarked on board the school-ship and her tender according to complement, are detailed as signalling and seamanship instructors. They have charge of the seamanship instruction and the signalling school in addition to the ordinary duties appertaining to their grade.

The petty officers, gunner petty officers, under and assistant instructors are to assist in the instruction in the Elementary School, and they will draw the extra pay laid down in the Royal Decree of the 4th June, 1891.

Members of the staff and crew not mentioned in the foregoing regulations will perform their duties on board the school-ship and tender as on board any other ship in commission.

A draughtsman from the Gunnery and Torpedo Department at the Ministry of Marine will also be embarked on board the school-ship; should others be required, a demand is to be made for them to the Ministry.

The Ordinary Courses.—The number of pupils will be settled by the Ministry of Marine. A Lieutenant-Commander of the school ship takes part in the Commission, which, under the presidency of the Commandant of the Seamen's Corps, chooses the pupils from among the seamen. There take part in the ordinary course—1st, able seamen, who are picked out by the above-named Commission; 2nd, boys from the Training School, who are not less than seventeen years old; 3rd, the volunteers enrolled for service as gunners; 4th, those gunnery and torpedo factory apprentices who, from want of requisite mechanical knowledge, are rejected from the schools of those departments, provided they are not less than seventeen years old. Men who have less than three years' active service to complete are not allowed to join the school.

Active men of strong constitutions, good eye-sight, and corresponding intelligence will be those selected for the school courses; the boys from the Naval School must possess a physical development in accordance with their age. Those seamen who were mechanics before joining, and such who can read and write well, or who apply to go through the course, will be selected by preference.

The Commandant of the school-ship is empowered to send back to the Seamen's Corps all those who do not appear likely to develop into

good gunners. Moreover, the Officers commanding divisions are, at the end of the first month of training, to place before the Commandant a list of those who they do not think it advisable should continue the course.

The ordinary courses are divided as under:—

Course A, which commences on the 1st March, and ends on the 31st August.

Course B, which commences on the 1st September, and terminates on the 31st January.

These courses can again be subdivided into as many periods as the Commandant may consider convenient or the Council recommend.

The method of instruction and of the drills is laid down in the military regulations; the theoretical portion of the first is to be limited to general details and principles. The instruction is imparted in accordance with the programme laid down for the classification of the men as gunners and skilled gunners, special pains being taken over the elementary instruction of the pupils. Instruction time is to last on an average six hours a day. Holidays and Saturdays are excepted, the general cleaning of the ship taking place on the latter day. In the summer the men receive swimming lessons. The target practice during the course is settled by the Commandant, on the advice of the Council of Instruction.

At the end of each instruction period, the Divisional Commanders lay before the Commandant the general roll, in which is recorded the progress of each scholar. Twenty points are the highest marks; the "nil," absolute ignorance. At this time the Commandant and the Council have to be present at the drills of each division.

Each Divisional Commander has at the end of the ordinary course, after the examination of the pupils, to complete the general roll, which also shows the results of the target practice and the conduct of the men, and he then lays it before the Commandant. On the basis of the return the men are classified by the Council, assisted by the Divisional Commanders. Men who have less than 10 points are not qualified; those with from 10 to 15 points receive the rating of gunner; those with over 15 points are classed as higher grade or skilled gunners.

The men who have qualified are immediately redrafted to the Seamen's Corps. The Commandant of the school-ship can withhold the certificate of men of bad character, forwarding it to the corps Commandant, who keeps back the advancement of any such men until they have been favourably reported on for at least six months on board a ship in commission. The men can also receive, according to their efficiency, certificates as signalmen, and as captains of guns.

The Second Commandant has, on the making out of the men's certificates, to make any remarks which he may think necessary, laying stress on such points as whether a man is a skilled signalman, whether he has profited sufficiently by the doctor's lessons to be able to afford first help to the injured, whether he possesses special qualifications as a marksman and captain of a gun, and finally, if his certificate should be withheld for misconduct.

After the striking off of men who on trial are considered as unfit to go on with the course, no other pupils are to be disembarked, except by special order of the Minister, unless it be for punishment or sickness.

The Final or Supplementary Course.—Those qualified to take part in this course are:—1st, the men who have taken certificates as skilled gunners in the ordinary course, and who seem likely to obtain at the end of the supplementary course a certificate of competency for petty officers; 2nd, the gunner armourers who come from the Technical School at San Vito; 3rd, the gunner armourer pupils from the school at San Vito who are not classified as armourers, not having displayed the requisite technical knowledge in their examination; 4th, Those men, classed as gunners, who are sent as pupils from the Seamen's Corps, in order to fit themselves for examination for advancement, or to make themselves acquainted with the newest equipment.

The supplementary courses are divided as follows:—

Course C, which begins on the 16th August and ends on the 15th December.

Course D, which, beginning on the 16th February ends on the 15th June.

Each course is subdivided into two periods as under:—

Course C	{	1st period, 16th August to 15th October.
	{	2nd „ 16th October to 15th December.
Course D	{	1st period, 16th February to 15th April.
	{	2nd „ 16th April to 15th June.

The scholars of the supplementary course are divided into three classes:—1st, the gunner armourers and armourer pupils who come from the school at San Vito; 2nd, the skilled gunners; 3rd, the petty officers. At the end of the first month those skilled gunners who do not show sufficient capacity are struck off and sent back to their corps, their certificate of qualification as skilled gunner being forfeited. The Commandant of the school is empowered to strike off and disembark any man who shows a want of zeal in his studies, or is badly reported on.

The course of study is so arranged that each pupil is worked up in the subjects necessary for his advancement. The target practice during the course and the regulation of the studies are settled by the Commandant in consultation with the Council. In the summer all the men have to attend the Swimming School; the ordinary duties of the ship are carried on as on board the school-ship during the ordinary course.

At the end of the supplementary course all the men who have been under instruction have to undergo an examination according to an established scheme, for advancement to a higher grade. Certificates for competency in signalling, as well as for special skill as captains of guns, will also be given. Copies of the results of the examinations are forwarded to the Ministry of Marine, and to the headquarters of

the Seamen's Corps. At the completion of the course, the men who have taken part in it are disembarked, except those who are selected to act as instructors or assistant instructors for the ensuing ordinary and supplementary courses.

The Second Commandant of the tender fills up the certificates of the pupils and submits them, with his remarks, to the school Commandant.

Twice a year, that is to say, at the end of the supplementary courses, an Examination Board, under the presidency of the Commandant of the school, examines those gunners who are not embarked on board the school-ships, but who are present in port and are anxious to pass for promotion. Men who are embarked on board ships in commission and are absent from the seat of the school are examined on board their ships. A special report can always be made of those gunners who qualify themselves for the higher grade, though not embarked for the course; the points they obtain according to the system of marking laid down in the school-ship being mentioned in the report.

Men who pass the examination for promotion receive a certificate of competency, which holds good for three years; if at the end of that time they are not promoted they are required to pass again.

Expenses of the School—The school has its own expense department independent of the ship's administration and ship's cash chest.

For each scholar in the course there is an allowance of half a lire a month, out of which the following charges are defrayed:—Office stationery and necessaries for the elementary and evening classes; military circulars, which are issued free to the instructors; books for the school library, and yearly subscriptions for service technical journals, and others relating to technical experiments; special registers and printing for the school; supply of books and papers to the men's library; a premium of 50 lire and under for instructors who have specially distinguished themselves during the course. Fines inflicted on the instructors for breaches of discipline are thrown into this fund. The Administration is allowed a fund, which is not to exceed 50 lire a month, for unforeseen expenses. The fund is managed by the Council, who are allowed the assistance of a clerk.

The Archives and Library of the School.—The archives of the school are kept in accordance with a regulation of 30th August, 1865. In addition are kept: register of the minutes of the Council of Instruction, of all experiments carried out, of the classification of the men who pass through the school, of the gunners and petty officers who have taken part in the supplementary courses, and other registers relating to the work of the school. All books bought for the ship form part of the library, as well as all plans and models; the ship's library is joined to the school library.

The Examination Board vote first in secret, using white and black balls over the passing or rejection of candidates, then openly over their classification; the points from 0 to 9 constitute rejection, from 10 to 20 competency.

The Torpedo School-ship.

General Regulations.—The object of the school is to train a corps of skilled torpedoists and torpedo-electricians, also to give opportunities to men who wish to qualify for advancement. A ship in the Reserve is used as the school, and is stationed at one of the ports, which is the headquarters of a naval command. Attached to her as tenders are:—1st, a ship of the second or third rank also in the Reserve, armed with quick-firing and light guns, and also supplied with all the prescribed electric fittings and lighting and torpedo-tubes; 2nd, a torpedo-boat flotilla, consisting of two sea-going torpedo-boats, a 1st-class coast torpedo-boat, a 2nd-class coast torpedo-boat, and one of White's torpedo steam pinnaces; 3rd, a tug in commission, fitted, if possible, with quick-firing and light guns, and also electric light apparatus; 4th, four steam pinnaces fitted for exercising with the electric light and spar torpedoes, and for firing machine-guns and guns of small calibre; 5th, four rafts for laying out submarine mines; and, lastly, four pinnaces fitted for diving apparatus. The torpedo-boat flotilla is manned by men from the school-ship, who receive extra pay.

The regulations detailing the duties of the Officers, petty officers, and men, the teaching staff, the number, length, and commencement of the courses, and the duties of the Council of Instruction are identical with those for the Gunnery Ship.

There are two ordinary courses and two final courses, which commence and end on the same days as the gunnery courses, and are similarly divided and subdivided.

The Ordinary Courses.—The number of pupils is settled in accordance with the requirements of the Service by the Ministry of Marine. The men are selected from the Seamen's Corps by the Committee of Officers which select those for the Gunnery School. The men who take part in the courses are:—1st, the seamen selected by the Committee; 2nd, boys from the Training School who have been selected for the torpedo service, and are over seventeen years old; 3rd, volunteers who have joined the torpedo service; 4th, those gunnery and torpedo factory pupils who have been rejected by the technical schools, for lack of sufficient mechanical knowledge, and who are not less than seventeen years of age. Men who have less than three years' active service to complete are excluded from the school. The regulations for the ordinary course are analogous to those for the gunnery course already described.

The Lieutenant-Commanders in charge of divisions are responsible for the following registers being kept:—1st, the general muster roll of their divisions; 2nd, a register of firing and target practice; 3rd, a journal of practice with the Whitehead torpedo; 4th, a journal of the exercises in diving. A petty officer is placed at their disposal to act as clerk.

In the last month of each course the more advanced scholars are instructed in, and practised with, the search lights.

The course of submarine mining takes place in the interval between the two ordinary courses, and lasts a month. The efficiency of each

torpedoist in this branch of his work, who attends the course, is noted on his certificate.

The Supplementary Course.—Those who are selected for this course are:—1st, pupils of the ordinary course who have been classified as skilled torpedoists, and who are expected to be able, at the end of the final course, to obtain a certificate of qualification for petty officer; 2nd, the torpedo artificers and torpedo electricians who come from the school of San Bartolomeo; 3rd, those scholars from San Bartolomeo who are not classified as torpedo artificers or electricians from want of the necessary technical knowledge; 4th, those torpedoists who are detailed from the headquarters of the Seamen's Corps either to qualify themselves for advancement or else to make themselves acquainted with all the latest improvements.

The other regulations for this course, as well as for the examinations and the duties of Examination Board, are identical with those for the Gunnery School already described.

There is an allowance of 1 lire for each scholar monthly, towards the expenses of the school. The regulations for the archives and library are similar to those in the Gunnery Ship.

INSTRUCTIONS FOR THE SWIMMING OF CAVALRY.

(Provisionally issued for the Guidance of the German Cavalry.)

CAVALRY should be able to cross any streams that may be met with. In the case of large rivers, in which long distances have to be swum, this will only be possible for the mass of the cavalry if they have the aid of boats. Still, every endeavour should be made to have in each squadron a certain number of patrols which, lightly armed and carrying only a light kit, would be able to cross even broad streams without assistance, and, having arrived on the further bank, could continue their march without delay.

For both kinds of passage, it is necessary that some of the men should be able to swim. A squadron which has no men who can swim, cannot successfully undertake swimming exercises for the horses, whether with or without boats. Only a man who knows that he can easily reach the bank in case he has to leave his horse or the boat in mid-stream,¹ will act intelligently and with confidence in a boat or on a swimming horse.

Considerable stress must, therefore, be laid on the instruction of the men in swimming. In most cavalry stations, the small pieces of water necessary for this can be found ready for use, or may be made of the required depth. A sufficient number of men must also be instructed in rowing, punting, and steering a boat. This instruction, as well as that in swimming, may replace gymnastics during the hot summer months.

Independent Swimming of Horses.

The most important preparation of horses for the passage of all kinds of streams consists in inspiring them with perfect confidence when going into deep water. It is only by constant exercises with this object in view that it is possible to remove the tendency to lose their heads, to which many horses are subject when in the water. All horses can swim without further instruction, or, at any rate, they learn to do so in a very short time. The safest method of swimming, and the one by which the desired object is most quickly attained, is that in which the greatest freedom is given to the horses. Thus,

¹ In the broadest rivers which have to be taken into consideration, a man would have to swim at the most 500 metres from the middle of the stream to the bank, the current being taken into account. A man can swim 100 metres in three minutes. Experience shows that sometimes even good swimmers suddenly lose heart in mid-stream from want of confidence, and then sink as if paralysed. The confidence of the men must therefore be increased by training as many long-distance swimmers as possible, *i.e.*, men who can swim for half an hour at a stretch.

teaching a horse to swim consists in taking away his fear of water by having a good swimmer in the water with him. A good current in deep water is in this case advantageous, as it has been found by experience that horses, when they perceive the strength of the current, more readily give up resistance, and the current renders swimming easier.¹ As soon as a horse gets out of its depth, it swims straight to the front, so that it is only a matter of placing the horse's head in the direction in which it is to swim. The best way of guiding a horse is to knot the bridoon reins short,² the knot being placed on the middle of the mane. The swimmer, lying extended horizontally close to the horse on the up-stream side of it and holding on to its mane, allows himself to be towed by it, and by lightly feeling the near or the off rein as may be necessary with his free hand, holds its head in the direction required. Provided the aids are properly applied, resistance on the part of the horse to the feeling of the reins is hardly possible; but, if necessary, the horse may be given a blow on the cheek with the flat of the hand. In this way a good swimmer can guide any horse in the required direction if it be out of its depth, *i.e.*, from the moment it is obliged to swim; and previous to this point, the ordinary *aids* are all that is required. This is also the time for the rider to slip off his horse, which should not be done too soon or too late. The struggle which sometimes takes place (generally in consequence of badly applied aids) with a horse that may try to get back to the bank, has no danger for either party; if they separate, both reach the bank by swimming. Kicks in deep water hurt the swimmer as little as a short ducking hurts the horse. At the very first attempt, endeavour should be made not to allow the horse to have its own way. With particularly obstinate animals, it is advisable to employ different riders in order to attain the object in view.

When teaching a horse to swim, it should not be ridden while swimming, as the rider, clinging close to it and weighing heavily on its hind quarters, destroys its equilibrium, and the horse is liable to turn over or fall on one side. On actual service, even a man who cannot swim may be compelled to take to the water and trust for safety to his horse, the latter swimming in the general crowd and the man holding on to its mane.

Swimming Horses by Guiding them from a Fixed Point.

(*α.*) *By means of a rope from a boat or from the further shore.*—This method is, as a rule, to be employed only in swimming exceptionally refractory and obstinate horses, as well as when good swimmers are not to be had.

The rope, not a forage cord, must be used double without knots or loops, and passed through the head-collar ring, so that, by letting it slip through the ring, it may at once be let go. It is best to let the horse go free as soon as it gets into mid-stream, and has taken the

¹ On the other hand, practice in swimming in still water is quite sufficient to enable a horse to swim safely across rivers with strong currents.

² The bit should always be removed when the horses are swum.

direction of the further shore. The rope used should not exceed 20 or 30 yards in length, as otherwise it hangs down in a curve on account of its own weight, and when the rope is pulled, the horse's head is dragged under water.

(b.) *By the rider leading them close to a boat by means of the bridoon rein or a forage cord¹ passed through the head-collar ring, the rider sitting as low as possible in the boat.*—This method of swimming horses, as well as the preceding one, is only to be used when good swimmers are not available or not in sufficient numbers. Towing the horse after the boat is no assistance to it, but rather a hindrance, as it has to swim just the same as if it were free, but must regulate its pace according to that of the boat. It frequently happens, when swimming a horse by means of a boat, that the horse, in consequence of the force to which it is subjected, gives up swimming altogether, lays itself on its side, and allows itself to be towed along as if it were paralysed.

In actual practice, the most usual method of getting a body of cavalry across streams will be that of swimming the horses with boats. The disadvantage of hindering the swimming of the horse is more than compensated by the advantage of conveying the rider and his kit across without their getting wet. When crossing narrow, or only moderately broad streams (say 50 yards wide), it is advisable to use the boat as a ferry-boat, working on a double rope stretched across the stream. The boat, pulled by two men, one standing forward and the other aft, can, even with a fairly rapid current, be kept in the required direction; its rate of movement can be regulated to suit that of the horse, which is held by the bridle, so that the disadvantages of swimming the horses with boats, above mentioned, to a great extent disappear. In order to accelerate the crossing of the men with their kits, and the subsequent saddling, it is imperatively necessary that the articles of each man's kit should be tied together and then placed in the boat by troops and ranks. The unloading will be carried out in the same orderly manner, on the spot which is chosen as the saddling place, which must not be too near the landing place of the horses.

In order to ensure the passage being conducted in a calm and orderly manner, strict discipline must be enforced, the materials and means at disposal must be judiciously and properly employed, and non-commissioned officers and men told off for special duties.

(c.) *By guiding the horses from a foot-bridge.*—In this case it is best to guide the horse by a lance, the sling of the lance being unbuckled and made fast to the bridoon rein, as near as possible to the butt end of the lance. The rider, walking on the foot-bridge, can in this way regulate his pace to suit that of his horse, and can at the same time prevent any attempts at landing on the bridge. On the hither bank, one man leads the horse, if necessary, holding it on the further side until it gets into deep water, so as to prevent the horse

¹ The man holds both ends of the forage cord in his hand, and in case of necessity lets go the end which has no loop, and draws the cord through the ring.

being refractory, backing or rushing forward, as long as it is in its depth; as soon as it swims, it must be guided entirely by the man who controls its head. In the field, when a large number of horses have to cross, as in the passage of a regiment, brigade, or division, it is advisable to construct a foot-bridge. For the passage of a squadron or any smaller body of cavalry, it will often not be worth while to spend the time necessary for doing this, and the method described in (3b) will be more advantageous. For the passage of larger bodies by the aid of a foot-bridge, it is best to drive the horses *en masse* through the water, one horse, guided by a lance, leading the way, provided that the further bank is not unsuitable for securing the horses again. In such cases, the several squadrons are brought up to the crossing place and unsaddled there. The men put on their forage caps, take off their swords, and fasten them to the saddles by passing the girths and stirrup leathers round them. Having been told off by threes, Nos. 2 place the blankets on their heads, just as they were when on the horses, and hang their helmets on one arm; Nos. 1 and 3 then place a saddle on the head of No. 2, which is protected by the blanket.

The passage of the horses must not begin until all the saddles have in this way been placed on the opposite bank.

Loading the Horses when Swimming.

Although horses are not able to carry riders for any considerable distance when swimming, still loading, to a certain extent, is admissible. Most horses can easily carry the saddle and blanket without any special practice. The danger of their being weighed down by the wet blanket has but seldom been noticed. As the mess-tin is light enough to float of itself, it may be left attached to the saddle, as also may be done with the forage cord. It is quite different, however, with the rest of the kit; the best swimming horses can hardly keep above the surface for more than a minute when loaded with it. A considerable part of the weight does not lie near the back, but is fairly high up, so that the horse, when out of its depth, easily loses its balance, falls on one side, and is then lost; even when brought close to the bank by means of a rope, horses which have once fallen on their sides can only be got in an upright position again with difficulty, on account of the kit being thoroughly soaked. Horses swimming with the whole kit, turn over most easily in a current; on the other hand, in streams where there is no current, they can swim for very short distances with the full kit, as the water penetrates the latter but slowly.

From this it appears that a stream of some depth and breadth cannot be crossed by a closed body of cavalry without the aid of boats. But single riders (patrols) can swim across them after having taken the heavy part of the kit from their horses and distributed it among the nearest files. It is important that these quick distributions of kit should be practised.

Loading the Rider while Swimming.

The cavalry soldier, who is a good swimmer, can accompany a horse which swims well across a broad stream with full equipment, and, after a little practice, even with a lance.

The horse can easily carry the helmet, sword, and boots, the chief hindrances to the swimmer, as well as the rider, who holds on to its mane. In this case the only danger is when the swimmer parts from his horse. A strong swimmer, fully equipped, will even be able to keep up for some time apart from his horse, and to reach the nearest bank; this he will do most easily in a current, by swimming in a slanting direction. But in order to obviate the danger to which almost all men are liable, viz., the possibility of being separated from their horses even when the latter swim freely, they should always be lightened as follows during exercises in time of peace:—The boots are to be taken off and fastened with the tops downwards, one on each side of the front arch of the saddle, the sword is to be fastened to the rear arch of the saddle, and the forage cap is to be worn instead of the helmet, &c.

On the other hand, the men must be practised in carrying the carbine slung over their shoulders, the sling passing under the shoulder straps, &c.; the rolled cloak will remain on the rider, and carbine and blasting cartridges be put in the trousers' pockets.

It is understood, as a matter of course, that in exercises of this sort, special precautions are to be taken, such as providing boats, &c.

NOTICES OF BOOKS.

Almanach der Kriegs-Flotten, 1892. *Separatausgabe der Allgemeinen Theile aus dem "Almanach für die k.u.k. Kriegsmarine, 1892."* Wien: Gerold & Co. Pp. 252. Size $5'' \times 2\frac{1}{2}'' \times \frac{1}{2}''$. Weight under 6 ozs.

Aide-Mémoire de l'Officier de Marine. Par MM. DURASSIER et VALENTONS. 5me Année, 1892. Paris: Baudoin. Pp. 539. Size $6\frac{1}{2}'' \times 4'' \times \frac{3}{4}''$. Weight under 12 ozs.

Le Scuole di Marina all' Estero e in Italia. Par DANTE PARENTI. Roma: Forzani, 1891. Pp. 267. Size $9'' \times 6\frac{1}{2}'' \times \frac{1}{2}''$. Weight under 1 lb.

The Naval Annual, 1892. Edited by T. A. BRASSEY. Portsmouth: Griffin, 1892. Pp. 575. Size $9\frac{3}{4}'' \times 6\frac{1}{2}'' \times 1\frac{1}{2}''$. Weight under 3 lbs. 4 ozs. Price 12s. 6d.

Lord Brassey will forgive us for having placed the sixth annual issue of his book in the same list with three other books with which it has only one feature in common, that of being a work of reference with regard to foreign navies. The subjects and the writers in the "Naval Annual" are as follows:—"Progress of British Navy, 1891-92," by the Editor; "Progress of Foreign Navies, 1891-92," by E. Weyl; "British Naval Manœuvres," by J. R. Thursfield, who contributes also the chapter on "Foreign Naval Manœuvres"; "Descriptions of the Ships Building or Completing," by F. K. Barnes; "Marine Engineering," by R. C. Oldknow; "Royal Naval Exhibition," by H. O. Arnold Forster; "Chilian Civil War," by W. Laird-Clowes. Part II, by Mr. Barnes, contains "Tables and Plans of British and Foreign Armoured and Unarmoured Ships." Captain Orde Browne, in Part III, deals with Armour, Ordnance, and Quick-Firing Guns. Part IV contains a great number and variety of Statistics, Official Statements, and Figures, compiled by Mr. Laird-Clowes; and in Part V, Lord Brassey himself treats of Manning and Training, Shipbuilding Policy, and Navy Estimates.

Architecture Navale. Théorie du Navire. Par MM. J. POLLARD et DUDEBOUT. Tome III. "Dynamique du Navire: Mouvement de Roules sur Houle; Mouvement Rectiligne Horizontal Direct (Résistance des Gares)." Paris: Gauthier-Villars et Fils, 1892. Pp. 523. Size $9\frac{3}{4}'' \times 6\frac{1}{2}'' \times 1''$. Weight under 2 lbs. 8 ozs. Price 12s.

Elektrotechnischer Unterricht und Anleitung zum Betriebe elektrischer Anlagen insbesondere auf Kriegs-Schiffen. Von M. BURSTYN. Pola: Gerold's Sohn in Wien, 1892. Pp. 234. Size $9\frac{1}{2}'' \times 6\frac{3}{4}'' \times \frac{1}{2}''$. Weight under 1 lb. 2 ozs. Price 4s.

Die Schiffs-Station der k. und k. Kriegs-Marine in Ost-Asien. Reisen S.M. Schiffe "Nautilus" und "Aurora," 1884-88. Von VON BENKA. Gerold's Sohn, Wien, 1892. Pp. 990. Size $9\frac{3}{4}'' \times 6\frac{1}{4}'' \times 1\frac{1}{4}''$. Weight under 3 lbs. 4 ozs. Price 12s.

Barracks and Battlefields in India; or the Experiences of a Soldier of the 10th Foot (North Lincoln) in the Sikh Wars and Sepoy Mutiny. Edited by the Rev. CÆSAR CAINE, with a preface by Major-General Sir H. M. HAVELOCK-ALLAN, Bart., V.C., M.P. York: Sampson. London: Kelly, 1891. Pamph. Pp. 131. Price 1s.

Rulers of India. Mountstuart Elphinstone. By J. S. COTTON, M.A. Clarendon Press, Oxford, 1892. Pp. 222. Size $7\frac{1}{2}'' \times 5'' \times \frac{3}{4}''$. Weight under 14 ozs. Price 2s. 6d.

The biographer tells us that "on the long roll of civil servants of the East India Company, no name possesses a greater charm than that of Mountstuart Elphinstone." His Indian career extended from 1796 to 1827. "As a diplomatist and administrator, he exercised a decisive influence upon the fate of Western India, at the critical epoch when British order had to be substituted for Marathá turbulence; his memory is still revered in Bombay—by English and natives alike—for nobility of character, justice, and encouragement of education; his 'History of India' has won for him a permanent place in literature. Elphinstone's long life witnessed almost the entire drama of British conquest." These quotations are followed by other statements, no doubt correct, of a similar character. The prologue raises the expectations of the reader, and these expectations are hardly fulfilled, but no doubt this is due to the condensation which the biographer had to effect in order to bring into a sketch the great career of a great man.

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Friday, June 10, 1892.

SIR THOMAS CRAWFORD, M.D., K.C.B., late Director-General
Army Medical Department, in the Chair.

AMBULANCE WORK AND MATÉRIEL IN PEACE AND WAR.

By Mr. JOHN FURLEY.

As soon as I had accepted an invitation from the Council of the Royal United Service Institution to give a lecture in this theatre on "Ambulance Work and Matériel in Peace and War," though fully appreciating the great compliment, I found myself in front of an immense task. The subject proposed is a very comprehensive one, and it might easily be divided into three separate lectures: 1. Ambulance work in peace; 2. Ambulance work in war; 3. The manner in which the former can be made subservient to the latter. It is perhaps within my competence to deal in some measure with the first and third parts of the subject, but I naturally hesitate from venturing to express opinions on matters which are exclusively military. However, after a week's consideration, I accepted the flattering invitation, and I now trust that, whatever my shortcomings may be, and inadequately as I may perform the duty assigned to me, full credit will be accorded for a sincere desire on my part to assist, to the extent of my humble powers, in the solution of one of the most complicated and difficult problems of modern times, and one in which civilians have as great an interest as soldiers.

Although I am not in a position to treat this subject in the full and exhaustive manner which you have a right to expect from this place, I think I can understand why a layman should be invited to express an opinion on matters which are daily, and deservedly, engaging more public attention. Is it not because the subject is one which appeals to humanity, and in which every man, be he soldier or civilian, and,

indeed, every woman, claims to have a share? But I need your fullest indulgence, as the difficulties of my position are increased by the fact that for more than a quarter of a century I have been closely identified with practical ambulance work in well-nigh every part of Europe, both in peace and war, and the point of view from which I regard it is, in many respects, entirely different from that which the military administrator occupies. Whilst he is more or less bound by the rules and regulations of the Service to which he belongs, he probably looks upon me in the same light as did Dr. William Howard Russell, when, in a friendly spirit, he characterized me as a chartered libertine of philanthropy.

I need hardly assure members of the military profession that I have no intention to trespass on ground which properly belongs to them, but I am bold enough to think it quite possible that, whilst confining myself to limits within which I have had some experience, I may be able to show how, in some degree, the Army Medical Service can be supplemented in time of war, and how something may be gained by co-operation between military and civil organizations. If I appear somewhat egotistical, this must be attributed to the fact that, not being entitled to act as a critic of military institutions, I am obliged to bring forward the results of experiences shared with others, and of experiments due to my own initiative. The principal object in view, then, will be to indicate the points where civil and military systems touch.

And first I shall say a few words with regard to ambulance transport matériel. In this the stretcher is the most important element, and the essential features of its construction should be simplicity, strength, and lightness. As a modest inventor, I have also persistently striven to attain uniformity in size, if in no other respect. This uniformity is almost as necessary in peace as in war. How much suffering might be saved if all European Governments would adopt a uniform measurement for stretchers, that is, as far as the length and breadth are concerned. What gratuitous suffering is caused when a wounded man has to be moved from one stretcher to another, because one is made to fit a particular ambulance carriage and the other is not! If all stretchers were uniform in size, ambulance wagons would be, of necessity, constructed to take any of them, to whatever army such vehicles might belong. At the International Conference of Red Cross Societies, held at Geneva in 1884, Sir Thomas Longmore, M. Ellissen, of the Société Française de Secours aux Blessés Militaires, and I brought forward a proposition with this object, but without much success.

In peace this uniformity is equally advantageous, if not essential. When acting as the Director of the Ambulance Department of the Order of St. John, I endeavoured, and with some success, to obtain it. The work of the Invalid Transport Corps was thus very much assisted, and, as an interesting example, it may be mentioned that one of the first invalids, for whom arrangements had to be made for a long journey, was the late Lord Cardwell, who was brought from the Mediterranean to Eaton Square without a change, his lordship

remaining during the whole journey in a bed made upon one of the ordinary stretchers of the St. John's Ambulance Association. This could not have been accomplished without the knowledge that the stretcher would fit into all the carriages which were used.

It is true that a Minister of War, with the fear of a House of Commons ever before him, is in a very different position with regard to stores of matériel than is a civil association. The latter can make experiments and issue matériel by slow degrees on trial, but the War Department of a Government, having had stores manufactured on a large scale, cannot sacrifice these in order to adopt subsequent improvements, without a very considerable loss of time and money, a loss which might be sanctioned for weapons of offence and defence, but which, unfortunately, would not, under present circumstances, be allowed for ambulance purposes.

There are in the room, for the inspection and comparison of those who may be interested in such matters, two or three stretchers of different patterns. One is the present Army regulation stretcher, Mark V, the invention of Surgeon-Major Faris. No. 2 is known as the "Furley" military stretcher; this is, in its dimensions, quite uniform with the "Faris" stretcher, but it differs from it in certain important details. For instance, the Army stretcher has an independent pillow which is, I believe, never used at drill or taken out on field days; and on active service it is sure to become separated from the stretcher. Now, in the second pattern I have mentioned, it will be seen that the pillow is formed by doubling the canvas at the head and closing it with a lace; into this straw, hay, a coat, rug, or other soft material can be put when required. There are also two other stretchers which have been largely used by the St. John's Ambulance Association. No. 3 differs in few respects from No. 2, but it has an automatic pillow; and No. 4, to which attention may be particularly invited, differs from all the others, in that the handles are telescopic. Now, had it not been for fear that by asking too much I should lose all chance of gaining a hearing for other proposals, I should long ago have advocated the use of stretchers with telescopic handles in the Army; but such a change would involve many considerations which do not affect the civilian. It would mean some sacrifice of the existing Army stretchers, a change in the ambulance wagons, and also some alteration in the drill of bearer companies. Imagine the effect of such a suggestion at the War Office! Great advantage would, however, be derived if the proposal could be adopted. The stretcher might be reduced in length from 7 ft. 9 ins. to 6 ft. or 6 ft. 6 ins., and thus every ambulance wagon might also be made 1 ft. 9 ins. or 1 ft. 3 ins. less in length: besides this, the transport of sick and wounded by rail would be much facilitated, and in tents and temporary hospitals the passages could be kept clear of stretcher handles, which are so often knocked against, to the great discomfort of those lying on the stretchers.

The authorities who order wagons to be built to receive the long stretchers do not have the inconveniences brought home to them so strongly as they are impressed on civilian ambulancers, who are daily

occupied in endeavouring to adapt their stretchers to vehicles of ordinary length. In the Mark V Service wagon, which is a combination of Mark IV, the American wagon, and the South African trek-wagen, the disadvantage of long stretchers is very evident to anyone who will give the least thought to the matter, as holes are made in the tailboard in order to allow room for the handles. The exposure of the poles of a stretcher to rough contact is a very serious matter to a badly-injured man lying upon it, for in such a case occasional shock cannot be avoided. Besides, the holes admit a draught of air from end to end of the stretcher. Putting on one side all the difficulties in the way of a change, telescopic handles have everything in their favour from the stand-point of the patient, the medical Officer, and, I may add, the carriage builder.

It may also be remarked that stretchers with telescopic handles, the beds of which are generally made about 6 ft. or 6 ft. 6 ins. in length, are not only to be recommended because their adoption would allow ambulance wagons to be made of less length than at present, but also because they are more easily adapted to ordinary carts, wagons, and trains.

Military stretchers with telescopic handles can, certainly, be made to combine simplicity of construction and reliability as regards strength and endurance, whilst the increase of cost (if any) would scarcely be appreciable.

Those who have had to deal with the subject of mule pack-transport may be interested to examine a jointed stretcher which is shown here to-day. This stretcher, when opened for use, is very similar to the military stretcher of the St. John's Ambulance Association, which has already been mentioned; but the shafts are made of wood, jointed in two places, with telescopic handles. The stretcher can thus be formed into a compact parcel, 37 ins. in length, and $6\frac{1}{2}$ ins. in width and height, and the weight being 29 lbs., six of them can easily be carried by a mule. This is a special military stretcher, not often likely to be required for civil purposes.

The next point to be noticed is that of two-wheeled litters. The policy of using such vehicles on active service will not, I think, be advocated in the present day by any military man; but in base hospitals and at home stations they are of the greatest use, and in Indian cantonments, or even during a prolonged siege, they might be found very useful. The "Ashford" litter was designed to meet the requirements of the St. John's Ambulance Association, and it has been adapted to the Service regulation stretcher, and is in use at some of the home stations. Here again, the advantage of uniformity is once more demonstrated. Let us suppose that a railway company has a stretcher at each of its stations, and an under-carriage at such of the stations as are within one mile of a hospital; in case of accident or illness on such a line, a patient arriving on one of the stretchers can be placed on any one of the under-carriages and wheeled without delay to a hospital. So, if ten or more stretchers are distributed over a town of a few thousand inhabitants, if one or two under-carriages are placed at convenient points, such as a townhall, a police office, or

a fire-brigade station, the bearers, if they have to take the stretcher any distance over a quarter of a mile, find relief for themselves and greater comfort for the patient by sending for an under-carriage to meet them on the road. Such under-carriages adapted to the regulation stretcher might often be conveniently used in the Army for short distances in preference to the ambulance wagons, which cannot be so speedily equipped.

The under-carriage of the "Ashford" litter has also been adapted to the Navy cot. Formerly, on the arrival of a ship in port, it was necessary to take an invalid out of his cot and place him on a stretcher, whilst by using this under-carriage he can remain in the cot until he reaches the hospital on shore.

And this brings us to the subject of ambulance wagons—a very difficult problem. If I were asked what army in my opinion possesses the best and strongest built wagons, I should unhesitatingly reply that it is the British Army, and I am afraid the answer would be the same if it were left to me to decide which army has ambulance carriages the least fitted for the conveyance of the sick and wounded. The reasons for this latter unfavourable comparison are chiefly due to two causes. In the first place, owing to the extent of this Empire and the variety of countries and races of which it is formed, Army ambulance wagons are made so that they can be rapidly taken to pieces and shipped to any part of the world; secondly, they are intended for a double purpose, namely, for the transport of stores as well as of invalids. I have no hesitation in asserting that no vehicle can properly meet these two requirements, as the springs which will bear a heavy load of stores are obviously unsuited when only three or four men and their kits are upon them. I am speaking from personal knowledge of these vehicles, in which I have made journeys of considerable length, and on those occasions I could but congratulate myself that it was not as a wounded man I was travelling.

Although a certain number of wagons specially intended for the carriage of the sick and wounded are absolutely necessary for every army, more attention should be devoted to the adaptation of means for making an ambulance carriage out of any country cart.

The expression "improvised methods of ambulance transport" is a very favourite one, but these improvisations are generally the result of much thought and of many experiments. We also know that in actual war they signally fail for want of the very simple material, without which the arrangements cannot be completed. "Improvised means of ambulance transport" is a phrase which ought not to be allowed in the Service, because it implies the postponement of preparation until a time when the greatest strain is put upon all resources, and it may not be possible even to extemporize. It is different in civil life, when we have only to deal with individual cases, and when those who have thought out the matter beforehand can generally find what they want.

The nearest approach to a real improvisation of ambulance material that I ever saw was the use which the late Surgeon-Major

Porter made of telegraph wire, which he found torn from the posts and scattered about the country in 1870 during the Franco-German War. Doubtless he had already decided what use he could make of wire, and fortunately he found a supply at hand, and of this he manufactured splints on the spot.

Both for civil and military purposes, too much time cannot be devoted to this subject of extemporized means, but as it is acknowledged how much can be done with the simplest things, such as rope, wire, canvas, iron staples, &c., I would strongly recommend that the employment of these be not neglected in favour of more costly and complicated appliances.

It appears to be the impression in some quarters that wherever a gun can be driven there also an ambulance carriage can be taken, and that for this reason such vehicles should be of the strongest description. I have seen empty ambulance wagons driven over broken country and the attempt made to bring them back again with wounded men in them; but it is doubtful if any Officer who had tried this once would repeat the experiment. Confining myself to Europe, I am inclined to believe that it is scarcely ever necessary for ambulance wagons to be taken off the roads, except when they can be driven over comparatively smooth ground, or it may be necessary to move them out of the way of a marching column. I have never known an instance in which the removal of wounded to ambulance wagons was not more speedily performed by leaving the wagons on the roads or on ground not intersected by ditches or other obstacles, and carrying them on stretchers to the wagon stations, even if the distance were 300 or 400 yards, and this plan certainly saves an agony of suffering to the patients.

All this, and if I am wrong there are those present who can put me right, tends to show that there need not be that great difference of construction between such ambulance carriages as can be used for civil purposes and those which have to accompany armies in the field. Absolute similarity is, for many reasons, impossible, but military ambulance wagons might be much better adapted than they are to the purpose for which they are intended.

Whatever opinions may exist as to wagons for use during a campaign, is there any reason for maintaining one type of ambulance wagon for all circumstances and all countries? The *sine quâ non* of Army ambulance wagons is that they should be able to take two regulation stretchers: but is it necessary that they should all be alike for peace or war, winter or summer? Is there a single one of these vehicles in the Home District at the present time in which one of us would care to be moved, say, from Woolwich to London? Had these wagons ever been tried by English Officers as, in common with many distinguished Officers, I have tried various patterns in use on the Continent, at the trot and the gallop, over smooth and rough ground, I am quite sure that some of the vehicles now in use would long ago have been condemned as lumber. It is only by trials such as these to which I have just referred that a right estimate can be formed, and even then every allowance must be made for the different

circumstances of the men who in a state of vigorous health submit, by way of experiment, to be carried on stretchers and then placed in these wagons, and those who, mangled by shot and weakened by loss of blood, have no choice left to them. No doubt apologists can be found for the wagons which for use in active service I have so unhesitatingly ventured to denounce; but will anyone defend their use in time of peace in our towns and on macadamized roads?

With the proviso I have mentioned that each wagon should be of a standard length and breadth, there is no reason why for home service our soldiers, when invalided, should not be carried from one place to another as comfortably as the civilian, or why they should not have as good springs to the carriages and as much protection from exposure to draughts of cold air. I never see one of our Army wagons with the red cross painted on it passing through the streets or along the country roads, but I invariably groan at the suffering entailed on those who are compelled to use them. I trust the time is not far distant when, at any rate for home service, all invalids, whether soldiers or civilians when they have to be moved, will be conveyed in carriages with comfortable springs and so covered as to exclude cold draughts.

I should not speak as I have been doing if this subject were new to me. In other countries I have travelled with wounded men in carriages which left little to be desired, and these vehicles stood the test of war. As an amateur I have also superintended the manufacture of a large number of carriages which have been built on my own patterns. I do not pretend to say that these are perfect, but I think, without undue vanity, I may assert that they tend in the right direction. I have made mistakes, but these very mistakes have been of some assistance to others. One of the first vehicles I had built was partly designed, though for civil use, on a military pattern, and the body was formed of a strong frame with canvas curtains, but I soon found that in this climate curtains were not proper for such a purpose, and therefore I never again used them except in an ambulance carriage designed for Cairo. These two carriages, one for Yorkshire and the other for Egypt, illustrate my argument that the British Army, though requiring carriages with an interior measurement of one uniform size, must alter the actual construction of them to meet the great variety of circumstances with which it has to contend.

Of the seventy civil ambulance carriages to which I have referred as having been built under my direction, all those of most recent construction have been made not only to take stretchers with telescopic handles, but also the Army regulation stretcher, so that they can be utilized for districts where they happen to be, and these might be usefully registered at the War Office. The plan for adapting a carriage of ordinary length to the Army stretcher is so simple that, I think, there is more probability of its adoption than that the pattern of the stretcher will be changed.

For many years I have strenuously opposed the use of horse ambulance vehicles on two wheels, but the altered conditions of war,

to which I shall presently refer, have compelled me to modify my opinions. The distinguished Austrian surgeon, Professor Billroth, states that in future it will be necessary to place a great number of light carriages even close behind the line of battle, for the purpose not only of transporting the wounded to the field hospitals, but also to remove them from the battle-field itself, provided that the ground allows it. Although I do not like to use carts with two wheels if it is possible to have them with four wheels, I must admit that they are occasionally very useful, especially on ground where a heavy wagon would probably become bogged.

The two-wheeled cart designed by Colonel Close, R.A., is very ingenious, and there is much in it to admire; but it is very heavy and expensive, it requires two horses, and altogether involves a waste of power. If a two-wheeled vehicle must be used, I prefer the little French ambulance cart, which can be drawn by a single horse or a mule. I have used such carts, each carrying a stretcher and one or two men seated, on ground where heavier carriages could not have been employed.

There is on the wall the drawing of a cart which, I think, might prove very useful; it will carry two men on stretchers and two seated, or six slightly wounded men seated. There are also racks for the rifles and kits. When wounded men are conveyed in a two-wheeled cart, the animal in the shafts should always be led, and not driven.

Mule cacolets still have their advocates, but for European warfare, except in the Alps, I am not disposed to give them any consideration. Even in the Pyrenees, during the last Carlist war, it was very seldom that wheeled transport could not be employed. The cacolet is practically an instrument of torture, and it should never be used if any other means of conveyance be possible.

As might be expected, more attention has been devoted to the subject of railway ambulance trains on the Continent of Europe than in this country. Here the distances are so much shorter than on the Continent, especially as such trains may be utilized from one country to another, as was done in 1870-71, when admirably arranged ambulance trains ran between the army before Paris and Metz and different parts of Germany. The most complete trains of this kind are to be found in France and Austria; these are chiefly due to the initiative of Baron Mundy, and in the latter country they are provided at the expense of the Order of Malta. In Germany special attention has been paid to the conversion of luggage vans for this purpose; and this system has also been adopted in Italy, where I recently had an opportunity of seeing a complete train so arranged, and of appreciating its merits in the course of a journey between Rome and Tivoli. In England, as far as I am aware, only two railway ambulance carriages exist, and these are intended chiefly for use between Southampton and Netley; but there is good authority for believing that, if ever the occasion should arise, the railway companies would be quite equal to it, and ambulance trains could be made up and run at short notice.

I must repeat that I have not much faith in "extemporized" methods, unless they have been carefully thought out and the necessary material prepared beforehand. With very simple means, ambulance trains can be readily arranged, but the first point is to select the vehicles which can be most readily adapted for the conveyance of seriously ill or wounded patients; the ordinary carriages will answer the purpose for cases of less gravity. Roughly speaking, it has been found that the luggage vans used on express trains are the best for such use, as they are well built, and the springs are superior to those on the vans of ordinary passenger or luggage trains, being longer and more elastic.

If Great Britain were engaged in a war on the Continent of Europe, or in Canada, it would be absolutely and immediately necessary to bestow more attention on this subject than has hitherto been done, and we could not do better than be guided by the experience of those States in which sanitary trains have already been largely used.

In arrangements for invalids on board ship, our experience is probably superior to that of any other country, but more attention might perhaps be bestowed on river and canal transport, for which the last Egyptian campaign has prepared the way in a very practical, though costly, manner.

Even such a brief allusion to ambulance matériel as I am able to make in this paper cannot omit some reference to the subject of portable hospitals, to which much attention has been devoted during the last few years. It was the late Empress Augusta of Germany who first gave a practical impetus to the consideration of this important question, and I may add that her name will ever be associated with the Red Cross and gratefully remembered by those who work under its flag. The patronage of the Empress Augusta was not merely nominal, but it was practical and intelligent, and she took an active part in everything which could tend to the development of Red Cross Societies, an interest which was not confined to Germany, but was extended to every country in which these and kindred societies exist.

In 1885 Her Majesty gave valuable prizes for the best portable barrack hospitals, and the competition took place at Antwerp. Three years later she gave other prizes on an equally liberal scale for the best equipment of such hospitals. As I had the honour to be a member of each of the international juries to which the decision was entrusted, I naturally feel more than ordinary interest in this matter. The result of these trials has been most practical and satisfactory, but we have not yet seen the whole of it. The first prize for the best portable hospital was given in 1885 to Messrs. Christoph and Unmach, of Copenhagen, for their hospital built on the system of the Danish Captain von Doecker: this is admirably adapted to meet the requirements of European countries the most widely different with regard to climate.

Recent experiments have, however, shown that, whilst under certain circumstances these portable houses may be of the greatest advantage, we cannot altogether dispense with the use of tents.

The most exhaustive trials that have yet been made of the two systems were carried out at the express desire of the Empress of Germany, who, in this respect, is following in the footsteps of the Empress Augusta. These experiments were made at Tempelhof, in the vicinity of Berlin, and the temporary hospitals were ready for use by invalids on the 1st July last, and continued to be thus occupied for six months, so that the extremes of temperature were experienced. Though it would take too much time to enter into all the details of these trials, it may be briefly stated that in some respects, especially for durability, the preference was given to the more permanent barrack, but for portability and rapidity of construction and installation the decision was in favour of the tents. The report admits that each system possesses special advantages: the Doecker barrack is more portable than any hut yet invented; it can be easily disinfected, requires to be painted only at intervals of two or three years, and it is particularly well adapted to retain a warm temperature in the autumn and winter; but, on the other hand, its construction occupies more time than could be allowed in case of the rapid mobilization of an army.

The double canvas tent can be manufactured in a few days, and put up and furnished ready for use in the course of an hour by three or four men; it is more airy than the portable hut, and is thus better adapted for the summer. It bore the test of very severe cold; it is, however, less easy to disinfect than the former, and is certainly less durable, but it is cheaper.

The final decision arrived at was that neither system could in every respect be absolutely preferred to the other, but that the advantages of both should be utilized. In time of peace, and when remote from the field of active operations in war, the Doecker huts can be recommended, but during war and in the second line the double tents have many advantages.

I may supplement these remarks on portable hospitals by inviting your attention to the ingenious invention of Captain Tomkins, which gained one of the Empress Augusta's gold medals, and of which there is a model in this hall, for the inspection of those who are not already acquainted with it. The "Tortoise" tent is a most useful addition to ambulance matériel, both for peace and war. For peace a movable hospital has long been wanted, not only for great casualties in which there are many sufferers, but also in epidemics. It would be better in such cases, especially in the provinces, to take a hospital to the spot where it is required than to remove the sick and suffering to town hospitals, which perhaps may be already full. The pioneer in this matter was, I think, Mr. Albert Napper, of Cranleigh, to whom we owe the origin of cottage hospitals. I endeavoured to assist in the same direction, but, until the competition for the prizes offered by the Empress Augusta, in 1885, no actual progress was made; we are now, however, within measurable distance of such a hospital as that advocated by Mr. Napper. Many occasions arise in time of peace when the "Tortoise" tent might be used with most beneficial results, such as great colliery accidents or shipping disasters

on the coast. I have had personal opportunities of estimating the value of these tents, once during great heat in Germany, and, for a longer period, during very cold and damp weather in South London, where for a month a number of invalids occupied one of them as a hospital.

This tent can be used without the wagon in which it is usually carried, and it is arranged to be borne by horses, mules, or even by men; but the wagon gives a greater value to the tent, as with it there is a hospital complete with beds, furniture, &c., for twelve or twenty beds with cooking apparatus and stores, and this can be extended in proportion to the number of "Tortoise" wagons available.

The "Tortoise" tent has been tried at great military manœuvres in France, Russia, Finland, Denmark, and Austria; it has been adapted to the ambulance wagons of these countries, as well as to those of Germany and Turkey, and it is well known at Aldershot and Bisley. One of its great merits is, as has been recognized on the Continent, that it can readily be adapted to existing military wagons, and this forms a strong recommendation to War Ministers who are dependent on Chancellors of the Exchequer.

I am glad to have this opportunity to congratulate Captain Tomkins on the ingenuity, energy, and pluck he has for many years displayed. Old Volunteers, like myself, can recollect his cooking stoves in the Victoria Camp at Wimbledon, and the hospitality these camp kitchens encouraged. By steady stages he has persevered until his modest stove has developed into a complete portable barrack, which is useful for a variety of purposes: for ambulance work in peace or war, for soldiers on the march, and also for sporting and exploring expeditions. The "Tortoise" has already made the tour of Europe, and it is not too bold a prediction to assert that, give it time, it will make the tour of the world.

Thus far my remarks have been confined to ambulance material. I now propose briefly to indicate how the Army Medical Corps might in time of war be supplemented by civilian aid. It would be an impertinence on my part to attempt to describe, much more so to criticize, the Medical Department of the British Army. There are gentlemen present who know far more about it and its resources than I can pretend to do. Nor do I intend to express any new ideas with regard to the Volunteer Medical Staff Corps, a valuable body which is capable of great development; or as to the latest organization sanctioned by the Secretary of State for War and the Commander-in-Chief on the recommendation of the Director-General, which will provide a Militia battalion for the Medical Staff Corps. I shall limit myself to that which is more within my own personal experience, and to the consideration of the assistance which might be rendered by a purely civilian element, especially in relation to home service.

The work of the Red Cross Societies may be compared to our Volunteer Army as some of us remember it during the first years of its existence. It sprang into being with such rapidity that it quite astonished the military authorities when they suddenly found them-

selves in charge of a supplemental Army. The control of this body was divided between the Lord-Lieutenants of Counties and the military chiefs, and the eccentricities of men who exhibited so much patriotism and who so freely gave not only their time but also their money towards the national movement were not too severely regarded. Gradually the character of the force was changed, and brought into harmony with the existing military institutions of the country, and much as the present Volunteer Army differs from what it was during its earlier years, there can be no doubt that it is now a most efficient and valuable addition to the Regular Army.

So it is with the Red Cross Societies. The Convention of Geneva was signed on the 22nd August, 1864, and the first war in which any of these societies took part, though to a comparatively small extent, was the Bohemian Campaign of 1866. Most of the European Aid Societies put forth their full strength during the Franco-German War in 1870-71, and we know what was done by the British National Aid Society, under the able direction of Lord Wantage; and, as women had a large share in this, may I also be permitted to name Lady Wantage, who assisted so materially towards the good results. But time has shown that such freedom and latitude as was then allowed, under the press of new and abnormal conditions, will never again be permitted to Aid Societies, nor do I think they should be. No doubt, in a Continental war, there will always be considerable irregularity in the way that neutral States in the neighbourhood of the belligerents will afford aid to the sick and wounded, should a great battle occur in close proximity to the frontier. No regulation will, under such circumstances, be quite effectual in stemming the current of philanthropy which will inevitably be let loose regardless of Conventions. We witnessed this in 1870 on the frontiers of Belgium, Luxemburg, and Switzerland. But such occasions are exceptional and no more affect the broad principles of the Convention of Geneva than do the kindly acts of people whose neighbours' house is on fire affect the law of trespass. The great and terrible experience of the Franco-German War and of subsequent campaigns has considerably modified such opinions as were previously held with regard to the Convention of Geneva, and although very liberal notions are still entertained, especially in this country, as to the right of benevolent neutrals, these will, I think, have received a severe shock on the outbreak of the next European war. The fact is, to follow out the comparison I have already made, the Red Cross Society of a nation will henceforth bear the same relation to the Medical Department of its Army as the Volunteers in this country maintain towards the British Army. The great military Powers of Europe have recognized their necessity, and the philanthropic ardour of the Red Cross Societies has not in any way been diminished by the efforts which have been very successfully made to bring them under strict military administration in time of war. The great secret is to allow to each society the fullest liberty to manage its own affairs during peace on lines agreed upon between the War Minister and the official representative of the Society, then when war is imminent the whole of

this Volunteer supplement can be readily mobilized and it becomes virtually a part of the national Army.

I have more than once described the plan adopted by Continental States in order to produce this result. On the present occasion it will, perhaps, be sufficient if I take France and Germany as the best illustrations. It would afford me infinite satisfaction, if in a humble measure my words could have some effect in this country, and if, learning from the dearly-bought experience of others, we might be induced to adopt a somewhat parallel system. The first step in this direction should be the appointment of an Officer (of high military rank if possible) to represent the civil Aid Societies at the headquarters of the Army.

In France the Red Cross Society holds a very prominent position. The Central Committee of Paris has, since its formation, maintained intimate relation with the military authorities, and it corresponds directly with the Minister of War through the medium of its President and with the Generals Commanding Army Corps, by means of delegates officially appointed. On the 3rd July, 1884, a Decree was passed with the object of bringing the Society into conformity with the changes that had taken place in the Army since the war of 1870-71, authorizing the *Société de Secours aux Blessés des Armées de Terre et de Mer* (the official name for the Red Cross Society of France) to supplement in time of war the military sanitary service, to distribute gifts offered by public generosity, to establish hospitals in places that may be indicated as requiring them, to render assistance in the transport by railway of sick and wounded soldiers and sailors, in the railway station infirmaries, and in all the auxiliary hospitals at the seat of war. Since this Decree, two others have been passed, dated respectively 16th November, 1886, and 21st December of the same year. The first recognizes *l'Association des Dames Françaises*, and the second, *l'Union des Femmes de France*. These Decrees limit the co-operation of the Aid Societies with the military medical services to the rear of actual hostilities and to the national territory.

Independently of this assistance the societies are authorized to distribute to the sick and wounded the gifts they have collected. The relations of the societies with each other and with the Official Director of the Military Service are defined by the above-mentioned Decrees. Every establishment of the aid societies is under the surveillance of the Principal Medical Officer of the district in which it is situated, who also superintends all the documents and registers prescribed.

The personnel of the three societies I have named is authorized to wear the uniform and badges prescribed by the Minister of War. All associations in France which, more or less, pursue the same object and which cannot be recognized as independent societies, are required in time of war to become merged in the Central Society, that is the *Société de Secours aux Blessés des Armées de Terre et de Mer*; there is only one exception to this rule, and that is in favour of those strictly local ambulances whose action does not extend beyond the communes where they are established.

At many of the most important railway junctions on the principal lines between Paris and the frontier of France, not only have certain rooms been apportioned for the use of the *Société de Secours*, but a large personnel and all other requisites for hospital use have been allotted for the same purpose. On the outbreak of a war, each of these temporary hospitals can be established and placed on an active footing as rapidly as the mobilization of the army can be effected; and, besides this, the delegates of the society are charged with the useful duty of bringing back invalids from the front and accompanying the railway ambulance trains. These movable and stationary hospitals form the special work of the *Société de Secours aux Blessés Militaires* in time of war, and they offer a large scope for the exercise of national philanthropy without the danger and inconvenience to which reference has already been made.

Great attention is also paid by this French society to the constant improvement of ambulance material; depôts have been formed in thirty-nine towns corresponding with thirty-nine territorial divisions of the Army, and trials of this material are annually made at the periods of the great military manœuvres. Moreover, schools of instruction for ambulancers and nurses have been established in Paris, and also at Marseilles, Lille, and Nancy.

In Germany, in time of peace, the fullest independence is allowed to the various aid societies which exist in all the States of the Empire, but on the outbreak of war the direction of all the different branches falls to the Central Committee of German Associations of the Red Cross, a body composed of delegates from the societies of all the States, acting under the control of a Commissary Inspector on behalf of the Imperial Government. Many hundreds of committees working in correspondence with the Central Committee of Berlin are scattered over Germany, and the result of this system is evident in the many admirable institutions which do so much good during peace whilst preparing for possible war.

One very important branch in Germany, as in France, has been the formation of depôts of ambulance material, divided into four distinct categories and placed under the management of a Commission of Surgeons and lay delegates of the Central and Ladies' Committees. The articles contained in these depôts are again subdivided into such as are absolutely necessary and those which may be useful. Models and patterns are from time to time issued for the use of all the affiliated societies, and in the same manner instructions are given as to the changes and improvements to be made.

The two examples I have chosen as illustrations of Red Cross work, as it is understood in France and Germany, are sufficient to show the manner in which the objects of the Convention of Geneva have been developed in most of the European States. The results have been so satisfactory, and of such wide-reaching importance, that criticism has been silenced. At any rate, when mistakes have been made, they have been of such a character that here in England they would be condoned, even if they did not receive full absolution. We in England have no sympathy for any scheme which locks up great

moral and material resources for a time of trouble which it is hoped may never occur. We, therefore, would allow the fullest indulgence to those who, whilst preparing for war, utilize to the uttermost the generosity of their subscribers and the energies of their personnel in meeting the calls of charity and philanthropy on the vast battle-field of daily life. This is no exaggerated expression, as those will admit who have studied the question in this large Metropolis, or amidst the teeming population of our great industrial and manufacturing centres.

I apprehend that there is no one who believes that the medical department of an army can ever be made fully adequate to the emergencies of great and frequent battles. It was the general recognition of this which gave birth to the Convention of Geneva, and the numerous volunteer societies which subsequently came into existence; and it is this knowledge which will continue to enrol men and women under the emblem of the Red Cross. In 1871 I first publicly advocated the desirability of organizing an ambulance system in peace for the requirements of civil life that might also furnish, if needed, a valuable supplement to the Army Medical Department in time of war; and during all the years I have been connected with the St. John's Ambulance Association I have never lost sight of this object. I was in good company: from the very first I was guided by the advice and experience of Sir Thomas Longmore, who is regarded throughout Europe as one of the greatest authorities on this subject; and more recently we had the valuable co-operation of the late Colonel Duncan, whose eloquent and powerful advocacy of first aid to the injured is still fresh in the memory of those whose privilege it was to be associated with him.

Aid to the sick and injured is quite as necessary in time of peace as in time of war; but whilst preparation is possible in peaceful circumstances, no satisfactory system can be hurriedly organized amidst the turmoil and excitement of war. The examples which I have already drawn from France and Germany show the manner in which volunteer ambulance assistance is understood in these two countries. The distinctive character and institutions of each nation prevent anything like a uniform plan being adopted in all countries, but I venture to submit that, with the machinery we already possess in England, we are in a position to place ourselves, in respect to the administration of aid to the sick and injured, both in peace and war, on a level with any of our neighbours. There is much which we can learn from them; but there is also much we have taught, and are still able to teach them. And having been permitted to take part in the first establishment in Germany of the Samariterverein, it is a satisfaction to me to think that this flourishing institution owes its origin, in a great measure, as its founder Baron von Esmarch admits, to the example of the St. John's Ambulance Association, and that it is now extending its influence through neighbouring States. The field of humanity is a large one, and, fortunately, it is one from which national distinctions promptly vanish. We can realize this when we see wounded enemies lying side by side under the same roof and receiving

equal attention from doctors and nurses, regardless of nationality; but it is well to realize at once that, however admirably a plan may be adapted to peace purposes, it cannot be extended to meet the demands of war unless it be incorporated as a part of the general military system, and this during a period of peace.

It is unnecessary to occupy your time in describing the work of the St. John's Ambulance Association, as this is so fully understood and appreciated throughout the British Empire; but it may be well to explain what has been done towards making this civil institution of great value to the British Army in case of war. It is quite true that at present this does not amount to much, but a very little encouragement on the part of the War Office might lead to a development that would have the most beneficial results for our soldiers and sailors.

A few years ago, in order to increase the usefulness of, and maintain an interest in, the work of the Association, small ambulance corps were organized, and these have since been formed into the St. John's Ambulance Brigade. The object was at first limited to local needs, but with the desire that war should be taken into consideration as well as peace, I was fortunate in finding a corps which had no hesitation in venturing on an experiment which may perhaps help to solve a problem.

Amongst the colliers of Derbyshire, one of the earliest ambulance centres was formed at Tibshelf in 1878, and this has not only been steadily maintained there ever since, but the results it has shown have encouraged other mining establishments to follow the example thus set, and which is due in a very large measure to Captain Stuart Wardell. The Birchwood pits, which are under the same management, also formed a centre in 1882, and the Medical Officers warmly testify to the good that has been done by these two bodies in minimizing the effects of the accidents, which are unfortunately of frequent occurrence. In each of these centres a corps of the St. John's Ambulance Brigade was formed in 1889.

Having been elected an honorary member of the Tibshelf Corps, a position of which I am very proud, I suggested that the members should submit to a similar drill to that given to the bearer companies of the Army, and in a very short time, under the instruction of Captain Wardell, assisted by competent Army sergeants, my wish was realized. The next step was to obtain permission for an official inspection. With the sanction of the Secretary of State for War, the Director-General of the Army Medical Department, Sir William Mackinnon, K.C.B., and Surgeon-Major Allin, A.M.S., inspected the Tibshelf and Birchwood Corps of the St. John Ambulance Brigade on the 28th July last. The field state showed that there were on the ground 180 Officers and men, all of them clothed in a neat and serviceable uniform, and they had with them two horse ambulance wagons.

Probably it may be permissible, without indiscretion, to give the reports of the Inspecting Officers *verbatim*:—

From Surgeon-Major Allin, M.D.

*To the Director-General Medical Division,
Horse Guards, London, S.W.*

*Rawal Pindi, Punjaub, India,
December 7, 1891.*

SIR,—

I have the honour to make the following report on an inspection of Captain Wardell's ambulance corps on July 28th, 1891, at Tibshelf. The parade consisted of an inspection of the general turn-out and equipment of the corps, the application of the triangular bandage; the formation of two-, three-, and four-handed seats; stretcher drill; the application of first-aid dressings; the lifting and lowering of the wounded on to stretchers; carrying to a collecting station and loading ambulance wagons.

I was much impressed with the turn-out and clean appearance of the whole of the members of the corps; the application of the triangular bandage and the formation of the handed seats were most creditably done.

Nothing could be better than the way in which first aid to the wounded was rendered and the dressings applied. The men had been thoroughly trained, both in the application and uses of the various appliances, and seemed to have a very intelligent comprehension of the subjects in which they have been trained. Great credit is due to Captain Wardell and his Officers for the thorough way in which the members of this corps have been equipped, trained, and taught, and the greatest praise to the non-commissioned officers and men for the very evident interest taken, and appreciation shown in the work.

I have the honour to be, Sir,

Your most obedient servant,

(Signed) W. B. ALLIN,
Surgeon-Major, M.D.

To this the Director-General of the Army Medical Department, Sir William Mackinnon, K.C.B., added the following remarks:—

I was present at this inspection and was very much pleased with the highly creditable manner in which the men went through their drill, as well as the proficiency they displayed in the different methods of dressing and bandaging, and placing and moving men on the stretchers.

The training of these men has evidently been carried out with much care, and reflects great credit on Captain Wardell.

In case of war, this body of well-trained men would form a valuable addition to our resources for sick and wounded in the district, and in the event of their services being required, it would be a wise step to attach them for duty to the military district, if they so desired.

(Signed) W. A. MACKINNON, D.G.

January 16, 1892.

It is an unpopular thing to admit that it is possible for a foreign foe to land on our shores; but is it not worse than folly to refuse to face such a possibility, great as our faith may be in the strength and ubiquity of our Navy? This being the case, nothing should be neglected that might help to diminish panic if the landing of a hostile force were threatened or effected. And not the least important step in this respect would be an arrangement for the care of the sick and wounded of the contending forces, without making too great a call on, or dislocating the ordinary work of the civil hospitals of the country. To meet this essential part of a complete military organization, my belief is that, at the present time, such an ambulance corps

as I have described might be formed in every one of the military territorial divisions into which England is divided.

But it is not only in the event of a hostile invasion of our shores that such a body of ambulancers would be of great value. If this country were engaged in a war abroad which should necessitate the putting out of the whole available strength of the nation, what an incalculable advantage it would be if the Army Medical Corps could be left free for foreign service! and I am sure this could be done. We have now in England the means on which the Government might rely in case of either emergency, and to utilize these it is only necessary that we should break away from some of our ideas as to insular impregnability and not a few notions as to bureaucratic infallibility, and improve on the example that has been set by some of the great Continental Powers of Europe. I will go even further, and assert that, late as we are in following examples to which we have long accorded a Platonic admiration, we are in actual possession of the personal and material means, which only require to be organized in harmony with our national character and institutions. As ambulance corps have proved of the greatest use in time of peace, and many already exist, each territorial district would soon have a body of men, with its proper complement of Medical Officers, and this at very small expense. The military training should be made as little irksome as possible to the men, and periodical inspections should take place on their own ground, for those who are the best ambulancers in the country are generally industrious workmen in the receipt of good wages, which they could not afford to sacrifice. Besides, the practice in first aid to the sick and injured, which is almost within their daily experience, renders it quite superfluous that they should be compelled to waste time in exercising on imaginary wounds, and there is no doubt that within one month in their own locality they gain, in daily experience, more knowledge in the dressing of wounds and the handling of injured men than they could acquire in a year spent at Aldershot.

In our comparatively small Army men cannot be spared from the combatant ranks; and now that the height and chest measurement of the men recruited for the Army Medical Corps have been reduced, the majority of the bearers are not equal to that work which the changed circumstances of modern warfare demand. No opportunity, therefore, must be neglected for supplementing this service with capable men, and we have at hand a field from which men of good character and admirable physique may be drawn for home service, and many of whom would volunteer for foreign service in case of emergency.

It would also be in many ways a great advantage if such a corps as this could be formed in each of the principal ports of the kingdom, officered by their own local doctors. In the event of a foreign war in which our own Army and Navy might be engaged, the sick and wounded, on being landed, could be treated on the spot. Under official control and inspection I believe that this plan would be found to work admirably well, whilst it would set free a large number of

Officers and men of the Regular Army whose services might be needed elsewhere. The philanthropy and patriotism of the country may be fully relied on, and, if necessary, not only the personnel but the hospital matériel also would be forthcoming. The whole of this might be done at a pecuniary cost so insignificant that it is scarcely worth consideration.

It would be well for the military authorities not to allow themselves, in this matter, to be trammelled by old traditions, but to meet one of the great difficulties with which they are now confronted in a bold and statesmanlike manner. Germany can produce corps of ambulancers who have served their time in the ranks, and, judging from what I have seen, these volunteers are a valuable addition to the Army Medical Corps; but the men whose employment is here advocated afford a far better guarantee that the sick and wounded would be well and conscientiously treated, although, from the point of view of a drill sergeant, they may not be so well set up and their appearance on parade may lack some of that smartness which is expected from soldiers.

I have already described the systems adopted in France and Germany, under which the Aid Societies are now organized, and some months ago I publicly stated my conviction that in future Red Cross Societies would not be allowed to act as they have done in late campaigns, but their services would probably be confined to the lines of communication from the second line of medical assistance to the base. But these are days in which we move very fast, and in no respect is this more evident than in the art of war. Within the short period that has elapsed since I ventured to print an opinion that volunteer aid would not be permitted in the first line, a great change has taken place. No official sanitary corps in any army has ever been adequate to the requirements of a great battle; it was this fact which compelled the adoption of volunteer aid by every civilized State. Under the conditions which existed previously to the introduction of the latest form of offensive weapons, it was naturally thought that this volunteer supplement of aid might be kept in rear, on the lines of communication, where, with proper organization, it would leave the Army Hospital Corps entirely free for service at the front: but, under the altered circumstances, it may be confidently predicted that an army which shall enter on the next war without a strong reserve of volunteer bearers, within easy distance of the front, will soon find itself in a terrible dilemma. The only alternative to such a difficulty would be in the event of a battle being fought, like that of Sedan, close to the frontiers of States, whose whole populations were ready to give all the assistance in their power for the relief of the wounded. It must not, however, be forgotten that this was a very exceptional case: the battle was a most decisive one, and the victors, being complete masters of the situation, were not inclined to criticize too closely the acts of those who relieved them of an enormous responsibility. In a word, in the next war, regimental bearers will not be able to act as such whilst the fighting is going on, but at the close of a great battle an immense work will devolve on the Army

Hospital Corps, which it cannot effectively meet unless assisted by a strong reserve of trained bearers.

In all grades of society we find a disposition to ignore the value of the medical profession until sickness or accident brings us into close and necessary contact with its members: we then are compelled to appreciate their value. If this be true in civil life, how much more so is it in the Army! Whilst no means are neglected which can bring the personnel and matériel of an army to the highest state of perfection, and field days and autumn manœuvres are regarded as the precursors of battles in which Officers and men will continue to add glory to the national flag, we are too much inclined to disregard the reverse of the medal, often as it has been presented to our notice. Undoubtedly the first object of a Commander is to win battles; but in what a position is a General placed, if, having won a battle, he is unable to advance owing to the multitude of wounded who impede his progress, and whom he cannot leave behind him without proper care! Whilst, on the other hand, if he move forward he requires his full complement of surgical and medical aid. It is, therefore, of the utmost importance that nothing should be left to chance; and if our Army is to be complete in all its parts, it is absolutely necessary that the ambulance arrangements for taking the field should be on an equal footing of excellence with the offensive means at its disposal; and, more than this, volunteer and supplementary aid should at all times be kept in touch with the official sanitary service, and there must be such an organization of the former in time of peace as will enable our Army, on the outbreak of war, to avail itself of this help, thus adding to its own strength and completeness without throwing out of gear or dislocating any part of the Civil Service of the country.

An important speech was recently delivered in the Austrian Delegations by Professor Billroth, on "Medical Services in the Field," of which a translation was published in the March number of the Journal of this Institution. In the same month an article on "The New Military Weapons and Explosives," by Sir Thomas Longmore, appeared in the "British Medical Journal;" and, still more recently, there was published in the same Journal an abstract from an address delivered at the Friedrich Wilhelm Institute in Berlin, "On the Surgical Relations of the New Projectile," by Professor von Bardeleben. These three documents, which have attracted much attention and have given rise to very serious thoughts, must surely lead those who are occupied with military subjects to ask themselves the question put by Dr. Billroth, "Are steps taken to improve the means of aid to the wounded in proportion to the increasing development of destructive agents?" One thing is evident, namely, that the system of collecting the wounded during an engagement will have to be completely changed. No bearer detachment could live for two minutes within the fighting line under the hail of projectiles which the new magazine rifles would now pour upon them, and this without the curtain of smoke which has hitherto, to some extent, veiled the movements of contending armies. The danger for the medical staff and bearer companies will

be far greater than that of the combatants, for whilst it is the duty of the latter to avail themselves of all the cover that can be obtained, the bearers have to move slowly and carefully with their burdens, and this generally in the open. My own impression is, though it is a thought one scarcely likes to utter, that in the next war the medical corps must leave the wounded where they fall, preparing meanwhile for the moment when the contour of the ground or the ebbing tide of battle may allow them to act. Under such circumstances, a wounded man would probably be safer whilst lying on the ground than if he were being carried off on a stretcher.

Sir Thomas Longmore tells us that "everything tends to show that, while the number of sufferers urgently requiring help will be vastly increased in future wars, the means of affording them shelter and surgical attention will be pushed back to a greater distance than has ever before been necessary." This compels us to consider how the present system of collecting wounded can be altered to meet the changed conditions. Professor Billroth puts the matter very forcibly as follows: "Now as to the greater length of trajectory of the new projectiles, you may say, What does that matter?—put the dressing stations a few hundred paces further back. If they were, say, 500 paces to the rear before, then they will be 700 or 800 paces to the rear now. Quite so. But for the bearers, who have to carry a heavy man weighing 18 or 19 stone with his kit, upon a stretcher, this increased distance means not only an immense increase of labour, but also makes the journeys much longer in point of time; consequently far fewer wounded can be transported from the battle-field to the dressing station in a given time. Just try this carrying for 500 paces or even 700 or 800 paces! It is no joke, and for any length of time absolutely impossible. Now you cannot set up a dressing station at the regulation distance from the corresponding army corps, &c., in the glare of the sun or in the rain. You must have some sort of cover for it, a house, a ditch, a patch of wood. Not that the surgeons are wanting in devotion in the enemy's presence, but what is to become of the wounded if the surgeons get shot? You may say that they are protected from this by the Geneva Convention. Yes, but what use is the Geneva Convention if your own side retreats towards the dressing station, or the enemy advances, and you find your dressing station in the firing line? This means shifting and hunting up a new place. No one can form a true idea of these difficulties who has not been through them himself."

The increased number of wounded, therefore, must entail a great increase in the number of bearers, which in our Service (the Austrian) is at present very small and insufficient. Yes, we must even come to the conclusion that, in future, it will no longer be possible to remove the wounded from the field by means of bearers, unless it is to go on for days together. Hence it will be necessary to place a great number of light carriages, even close behind the line of battle, for the purpose not only of transporting the wounded to the field hospitals, but also to get them away from the battle-field itself, provided that the ground admits of it."

Surgeon-General von Bardeleben, viewing the matter from a German point of view, says:—

“The first and most difficult task will be to remove without delay the enormous number of wounded out of the fire line. Who will be able to tell beforehand where bandaging places will be out of reach of the enemy's fire? Some urge an increase of sick-bearers and wagons for the removal of the wounded. This sounds very humane, but we must not forget that sick-bearers have to advance into the fire line and to expose themselves to the bullets. If we go on increasing their number shall we not also increase the number of wounded, not to mention other risks? Already the number of men provided for the transport of the wounded exceeds a battalion (1,000 men) for each army corps (24,000 men). Such demands are often inconsiderate and exaggerated. War is no humane institution. We surgeons are fully prepared to practise humanity as much as possible in war, but it must not be in such a manner that in order to effect an uncertain saving of one human life a larger number of lives of other men should be risked. The administration of the German Army has made great advances in increasing the number of men and wagons for the transport of the wounded since the experience of the wars of 1866 and 1870, and seems to have reached the limit to which, under existing conditions, it is possible to attain.”

The questions I have thus briefly considered, as to the altered conditions of war which the progress of science has developed, have been so ably treated by the unimpeachable authorities to which I have just referred, that it would be presumptuous on my part to attempt to amplify the important statements they have made. But as one who has served as a volunteer ambulancer in more than one campaign, I would strongly insist on the advisability of giving every encouragement to those civilians who having been enrolled for ambulance purposes in time of peace are able and willing to supplement the Army Medical Service in time of war. Such assistance, to be of any value, must be prepared beforehand, or it will only lead to confusion at the critical moment, when responsible Officers will have little time at their disposal for the organization of a new system. The most recent European wars astonished the world by the magnitude of the battles, and the enormous proportion of wounded men who, in the course of a few hours, and sometimes in a few minutes, strained and overtaxed the resources of the medical staff. Knowing this, and knowing also what men like Longmore, Billroth, and Bardeleben have foreshadowed, and looking forward to the future, it would be a criminal act were we to ignore the teaching of experience, and refuse to make a practical endeavour to keep the means of alleviating the horrors of war in some degree near the level of the art of destruction. There are men who bear honoured names, and for whom personally I have the greatest respect, who in regard to all changes connected with the Army bring everything to the touchstone of the Crimean War or even the Peninsular Campaign. I will not venture to question their opinion, except on the one point of ambulance work and matériel. If they still believe that it is

unnecessary the medical corps of an army should be kept up to the exigencies of what is euphemistically called scientific warfare, then I am afraid I shall be charged with offences which are generally attributed to ignorance. There are others who think, and with whom I am much more inclined to agree, that the progress of science is tending to render war almost impossible, and that the engines of war having been made so terribly destructive, and fair fighting being a thing of the past, we shall have no more war, as no Government will dare to incur the responsibility of beginning one. Be this as it may, surely no nation could patiently accept such a conclusion as a certainty, or sit down with the reflection that "sufficient for the day is the evil thereof." War is not like an earthquake or other unforeseen natural phenomenon; it is a calamity which we are daily anticipating by striving to make ourselves stronger than our neighbours. *Si vis pacem para bellum*. Recognizing this, is it not an absolute duty to do our utmost to lessen the gravity of consequences which are inseparable from war, and to inculcate the exercise of such work as a civic virtue of the highest importance?

The conclusions to be deduced are as follows:—

1. That the possibility of war and even of a foreign invasion must be admitted, and it is the patriotic duty of civilians as well as soldiers to be duly prepared for it.

2. That behind the Army Medical Staff Corps and the Volunteer Medical Staff Corps there should be a reserve to meet eventualities which have been already foreseen by some of the Red Cross Societies of European States, with the sanction and encouragement of their respective Governments.

3. That no Medical Department of an army can be maintained during peace in a state fully equal to the demand which will be made upon it by a war of any magnitude. Were it otherwise, a vast expenditure of money would be required, and a large personnel must be kept in comparative idleness, in order to meet possible contingencies that the heads of armies do not in peace-time consider of the first importance.

4. That the requirements of peace need a large body of ambulancers to be always ready to deal with injuries caused by the accidents of civil life, and the sickness which is never absent from dense populations. That such a body of trained men and women exists, and it is only necessary they should be organized, and kept in touch with the Army, to prove themselves a valuable supplement to the Army Hospital Corps.

5. That in each of the military territorial divisions of Great Britain a corps of civilians trained to administer first aid by the St. John's Ambulance Association, and drilled sufficiently to enable them, if necessary, to be attached to an army, should be formed. That except in case of absolute necessity, such a corps should not be removed from its own district, but that it should be periodically inspected on its own ground by an Officer appointed by the War Office.

(Such a corps, in case of foreign war, might be relied on to take over all the Army hospital duties of its own district, and thus set

free for service abroad almost the whole strength of the Army Hospital Corps. Many of these civilians would also enrol themselves for ambulance service abroad if such help were needed.)

6. That the ambulance matériel used in civil life, and especially the wheeled transport matériel, should be made in such a pattern as to be equally useful for the necessities of war as well as of peace, and that all horse ambulance carriages, now or in future used throughout the country, which will take the Army Regulation stretcher, should be registered at the War Office as capable of employment for Army purposes at home.

7. That a local Ambulance Corps, under its own Medical Officers, should be formed at the principal ports of the kingdom, and that, in case of war abroad in which our own Army may be engaged, these corps should be ready to undertake the care of such sick and wounded men, when landed, as it might not be expedient or possible to remove to the military hospitals inland.

8. That such a scheme as is involved in the above conclusions would, if adopted, in no degree lessen the responsibility of the military authorities to maintain the Army Medical Staff and Medical Staff Corps on the same footing of efficiency and completeness as every other branch of the Service; and that the proposed personal and material reserve would greatly strengthen the Army Medical Department in time of war, and that at a comparatively small annual cost, provided the Government would guarantee that in case of the mobilization of any or the whole of the Corps, those enrolled should receive the same pay and reward as men serving in the Regular Army.

Sir VINCENT KENNETT BARRINGTON: I need hardly say that I agree in the main with Mr. Furley, but there are two or three points on which I disagree. The first is about improvised means of transport. Mr. Furley states that improvised means of ambulance transport is an expression which ought not to be allowed in the Service. But I consider it a subject of very great importance, and one which should be carefully studied both by the Army Medical Staff and all those engaged in Red Cross work. I have had about five years' service in war, including several European campaigns and a revolution or two in South America, and my experience has been that nine out of ten wounded men never see the inside of an ambulance wagon, properly so called. The great mass of the wounded after a battle are conveyed to the hospital in the rear in the empty wagons that have brought up provisions and shot and shell. I think, therefore, there ought to be a great deal of attention devoted towards improving these improvised means of transport. In the Servian and Russo-Turkish wars most of the wounded men were brought back in country carts. Happily many of the Surgeons were acquainted with the system introduced, I believe, by some Swedish Surgeons, of preparing country wagons by first placing a layer of fresh cut branches, and then above this one of smaller twigs, and upon these to place a mattress. An ox-wagon, with large wheels fitting the ruts in the road, can thus be converted into a fairly good conveyance for wounded, infinitely better than the most costly ambulance wagon, should the gauge of the latter's wheels not fit the ruts. In such a case, even with the most elaborate system of suspended stretchers and springs, the wounded men are liable to be shaken most fearfully. I have removed wounded from modern ambulance wagons, and placed them by preference in the bullock wagons furnished in the way mentioned. In the last Turco-Russian war two of our own English Army ambulance wagons were sent out, and ultimately handed over to the Egyptian Contingent; but they could

not use them, as they were too heavy, and the wheels did not fit the roads. They gave them to me, as I happened to be Chief Commissioner of the Stafford House Committee; but the only way we could utilize them was for bringing wounded men along a hard road from the Varna Railway Station to the town hospital. With regard to the necessity of different kinds of wagons for different circumstances which Mr. Furley has recommended, he is a great authority, and I accept his judgment, subject to the above remarks. In the Carlist War special ambulance wagons for smooth roads were constructed, drawn by five mules. Each wagon could contain twelve men lying down. I saw them working satisfactorily for two years. They were built in two stories, taking six men on each story. During hard frosts the best ambulance conveyances I have ever known were the sledges used in the Servo-Bulgarian War. With regard to cacolets, Mr. Furley does not seem to believe in them as much as I do. Mr. Furley was in the Carlist War for some time, but, if he had been there during the latter part of it, he would have seen splendid work done by cacolets. The great mass of wounded men requiring conveyance are wounded in the hand, and for such cacolet transport is a very good way of conveyance in a rough or mountainous country. I cannot speak as a Surgeon, but I am supported by Surgeons who had a long experience of gunshot wounds in the Carlist War. On one occasion I conveyed eight wounded men a distance of 12 miles in cacolets, on three mules, without any other assistance. The men did not suffer at all during the journey, nor was any injury done to their wounds. I admire these stretchers very much that Mr. Furley has shown us to-day, but I dislike a doubling up jointed stretcher in war, as any joint may get out of order. I should, as far as possible, avoid all such complications, and would rather have the simplest form possible. With regard to the effect of repeating rifles and smokeless powder on war, I remember a discussion which took place at Woolwich when the late Major Duncan and several Army Surgeons spoke on that subject. Opinions differed immensely as to what that effect would be. I believe that the total proportion of wounded men to combatants will not materially vary from now, because if you refer to the proportion of the number of wounded in war after the adoption of breech-loading instead of muzzle-loading rifles, you will find that the proportion has not become greater. In fact, they say that in the old days of the *arme blanche* a greater proportion of men were killed and wounded than is the case even now with the breech-loading rifle. There is one general question I should like to touch on, that is, the position of Red Cross Societies in relation to armies in the field. I do not think a Red Cross Society, especially in England, ought to bear the relation to the Army Medical Staff that the Volunteers do to the Army, as suggested by Mr. Furley. The Volunteer Medical Staff is a very efficient body, growing every day: that is the body to stand in the relation of Volunteers, supplemented, we all agree, by funds from the Red Cross Society. But I think the Red Cross Society in the field ought to have an organization far more elastic than the Army or Volunteer Medical Staff. I think their Commissioner ought to be in a position to move rapidly, to fill up gaps, and to do many things which cannot be so conveniently carried out by the Army Medical Staff. I have the honour of being a member of the Council of the National Aid Society, and I know by our constitution that our first object is for the aid of British sick and wounded soldiers in war; but, as a matter of fact, our society is called upon generally, I may say nearly always, for foreign wars, and although I quite acknowledge that our organization should enable us to assist in any war in which Englishmen are engaged, yet happily our English wars are generally small wars, and our Army Medical Staff are perfectly capable of doing everything that science, art, and experience can accomplish. I had the honour of being out in the second Suakin expedition, and saw the good work done by the Army Medical Staff. I consider that Red Cross Societies should largely avail themselves of the assistance of distinguished civilian Surgeons. In many foreign wars they came gratuitously, or only for their expenses, and brought with them young surgeons and nurses belonging to their respective hospitals. I do not believe myself that the tendency of Governments to delegate Red Cross operations to the rear is as strong as Mr. Furley pointed out. In recent wars our Red Cross Surgeons were largely engaged in the front. I do not like the system adopted by many foreign Red Cross Societies,

of forming large dépôts of ambulance wagons and other matériel, much of which is sure to spoil or become obsolete, while a part of the Societies' income has to be devoted to maintaining such matériel. I think the Army Medical Department ought to supply all ambulance wagons required for our Army. I cannot sit down without expressing my great admiration of Mr. Furley's paper.

Inspector-General of Hospitals R. LAWSON: Mr. Furley is, I believe, quite aware that I differ from him in his opinion on several points, and I hope we shall agree to differ. With regard to his stretchers, the question of having telescopic handles was a subject that was frequently before us at the meetings of the Committee on ambulance equipment, but we could not find a handle of that description that would stand the work. Whether his stretcher that he has exhibited will, upon full experience, be found able to stand the work, I do not know. I like the look of it, but, like himself, I strongly object to adopt anything without having tested it fully. If his stretcher will stand the work, it will, no doubt, be a great improvement, because, as he has pointed out, in some of the present ambulance wagons the ends of the poles pass through the partition which separates the body from the *coupé*, and they are bound to be struck by people on the *coupé* to the inconvenience of the persons lying on them. Another inconvenience is that the handles projecting into the bottom *coupé*, which is supposed to contain three men, generally speaking, with wounds of the upper extremities, and those men passing out would have those poles, some 3 or 4 inches above their feet, to step over, with the risk of tripping and sustaining a severe fall. Another point with regard to the stretcher is this. We had a stretcher with a canvas bottom 6 feet 3 inches with a pillow at one end. With a stretcher of that length you will be able to accommodate most men with fractures of the thigh, lying upon them, without the foot touching against the partition at the end of the stretcher; but if you shorten it, you will, with a long man, render it absolutely impossible to carry him upon a stretcher with a fractured thigh or leg without taking out the partition and leaving part of the space unoccupied. There was another point that we recommended strongly with regard to the carriage of the stretcher, a most important point which seems to be systematically overlooked. In former days, when Sedan chairs were in use—I do not know that there are many persons except myself who really ever saw them—the carriers always had what they called “yoke slings,” a sling with two straps passing one over each shoulder and united behind the back of the neck to a cross-piece, to prevent their coming off the shoulder. That is by far the easiest way of carrying weight. Instead of that, we now have the regulation sling with a broad leather strap attached to the stretcher, brought up in front of the shoulder and passed round the neck, so that the man has not only to carry the weight, but he has to make use of strong effort of the muscles in the back to prevent his falling forward. The substitution of the “yoke sling” for the one at present in use would cost very little. It would be a great advantage and much safer and easier for the men to carry. Mr. Furley has entered a special plea in favour of having wagons of different kinds for use in this country on smooth roads. That of course he is quite right to do, and so long as they are used for that purpose, well and good; but the moment you go into the field, you cannot depend upon having smooth roads, or indeed any roads at all, and then you must be prepared with something that will stand rough usage. He has alluded to the possibility of bearers being able to carry the sick from the field up to where the wagons are waiting, without taking the wagon off the main road. I have not had an opportunity of looking into that in the open country, but I have examined the plan of a piece of country on a very large scale—about 10 feet to the mile—round the model of Waterloo up-stairs. I examined the field of action there to see whether there were any roads that could have been used. There were some, but very few would have met his views; so that upon that point we must depend more upon wagons and less upon bearers. With regard to wagons, the question is, how many people they could carry. There were the two prize wagons at Paris in 1867 brought before the Committee. Those wagons were adapted to carry six persons only, and we were told that they were lighter and far superior to ours in every respect. When they came over, I weighed them to see what they were, and I found of the three English wagons that had been described as totally unfit for service, clumsy,

heavy wagons, the heaviest was a hundredweight lighter than the lightest of these prize wagons. When I asked the person who came with them what weight the wagon was, he said, "1,300 lbs." I said at once, "Much closer upon 2,000 lbs."—that was the fact. They carried six persons in them, whereas our wagon was adapted for eight persons, two recumbent in the centre, and six sitting. Of course they might not be able to carry the total number; they might be sometimes obliged to take one more, but the important question arises here, to which Mr. Furley has alluded, that is, that if you had a wagon adapted with springs to carry eight people, that wagon, unless it had the full weight of persons or material in it, would be most uncomfortable to ride in, supposing there were only two or three people. I myself rode in such a wagon at the Cape, going through the country upon what was called smooth ground. I was sometimes obliged to sit in the wagon and hold on to the sides with each hand to prevent my head being knocked to pieces against the bars of the roof. That is going over smooth roads. Had there been the full weight in the wagon, it would have been very different. You cannot get a wagon that will carry ten persons, having springs adapted to that number, that will carry two persons only without making it very uncomfortable for the latter. On the contrary, if you put ten persons in a wagon with lighter springs, they would be so heavy that the springs would be no use at all. They meet that practically in this way, that while the spring is so arranged as to carry four or five persons without difficulty, they have what they call a check spring, a strong spring which only comes into operation when the wagon is coming down upon it. That is an expedient, and so far it is a useful expedient without which you could not get on. There are several other points I should have desired to notice, but, the ten minutes allowed each member for discussion having elapsed, I must make way for others.

Surgeon-Major W. S. PRATT: As a humble member of the War Office Medical Staff I should like, with your permission, to say a few words. And, first, with regard to the alterations and improvements that Mr. Furley suggests in ambulance wagons and stretchers. The great thing that we have to contend with is the Treasury. As long as we have a large stock of serviceable equipment in hand they naturally will not sanction anything further. At the same time I must say I will stick up for our own stretcher, and a good deal for our own ambulance wagon. You have to look at the men who handle these things. The skilled civilian bearer is careful enough, but Tommy Atkins and the young recruit do not understand these ingenious and complicated matters. And as to this beautiful stretcher that we see in front of us, if it only jams, he is apt to kick it into shape and to put it out of gear altogether. I think that thing would break down. With regard to the ambulance, Mr. Furley says he would like to see it carrying only sick and wounded, no goods nor gear of any kind. All our ambulance wagons are calculated for fighting in foreign countries, mostly savage countries. There are no railroads, and the best wagon we have now, devised by General Buller, weighs 18 cwt.; tonnage 11.08 tons. I do not think any General Officer going through a savage country would like to have a lot of light ambulance wagons taking up the horses and carrying only wounded men, and to give up those wagons that might be utilized for carrying heavy stores when they are not required for carrying the sick. I do not think he would be content to exchange those for very light ambulance wagons carrying nothing but wounded men. With regard to home defence and the elaborate arrangements as to railways and so on, it must be remembered that we are not like foreign countries with hostile foes on our frontiers, who are liable to cross the frontier at any moment and be in our country. We have the sea all round us, and before an army could invade England it would require that our Fleet should be swept off the seas. You can hardly imagine 150,000 men landing in England whilst our Fleet is in existence. If our Fleet is destroyed, there is only three or four months' food in England, and therefore it would become a question of surrender or starvation. If the enemy did land, the only thing they could do would be to make a dash on London. If that were to fail, hardly a man of them would get away. In such a case the whole resources of the country would be at our disposal—ambulances, hospitals, and everything else, and the whole fighting must be over in a brief period. With regard to arrangements made for it, there are at

present drawn up and in the possession of the authorities elaborate schemes for the reception of a very large number of wounded in London as a base hospital. Those wounded men could be cared for and nursed at once, but I do not think that all the elaborate arrangements of hospital trains, field hospitals, &c., suggested by Mr. Furley would be necessary, because if an invasion of England did take place, and if anything did occur, it must necessarily be decided in a very few days. With regard to the tents and these very elaborate and beautiful bar arrangements, they are capital things for civilians to use, but I do not think they would do, as far as I can make out, for very rough work in the hands of young soldiers. We have learnt by experience the evils of over-elaboration in our pharmacy wagons, which have been marvels of packing, but I do not think they could ever be used on active service. They are so beautifully packed that, when they are unpacked, I do not think there are four men in England who could put them together again. With regard to civilian Aid Societies, I had very good experience of them in the Franco-German War. I was present at Gravelotte and at the fighting round Metz, and I am more than ever of opinion that isolated bodies of Aid Societies are practically useless and should not be allowed. Whatever material and assistance could be given should be under the control of the Army Medical Department, and should not be allowed independent action. With regard to carrying the wounded from the fighting line to the rear, some years ago our men were finer men than they are now, as their height has been reduced to 5 feet 3 inches to 5 feet 5 inches. The new rifle has rendered necessary an increase of the distance from the fighting line to the dressing station, which will now be about 2,000 yards in the rear. Now I think it will be impossible for men of such slight physique to carry wounded men such a distance steadily and comfortably for even one journey, and they will be required to make several journeys, and I am afraid much suffering may be entailed upon sick and wounded by this decrease in the physique and bodily strength of the Army Medical Staff.

Mr. ARCHIBALD FORBES: Like my friend Mr. Furley, I am here as a layman, but he and I have had a good deal of service together among wounded men on battle-fields from time to time. My own experience covers the battle-fields of three continents, and some ten years of my life were spent mostly in caring for wounded men, either in relieving them as they lay, or in helping to carry them from under fire. It is because of this experience that I have ventured to intrude into this discussion with a few remarks. I was much amused by the observations made by Sir Vincent Barrington, when he spoke of the Egyptian Division in the Russo-Turkish War as rather scorning the ambulance wagons which he offered it. I can easily understand this, because I do not think that during that war any member of the Egyptian Division ever had any need for an ambulance wagon (except indeed, possibly, because of syncope from fright), since no man of that force ever waited to be wounded, having run away in advance of that period of a fight when wounds are being served out. He spoke also of cacolets having been of service during the Servian War, for the conveyance of men who were wounded in the hand. The usual treatment of Servians wounded in the hand in that war was to kick them into space with all possible energy, because of the certainty that the wound to the hand was invariably inflicted intentionally by the man himself, and, therefore, he was not entitled to a cacolet or any other conveyance.

Sir VINCENT BARRINGTON: I mentioned the Carlist War, not the Servian War.

Mr. ARCHIBALD FORBES: I also listened to Mr. Furley with a certain sentiment of pathos, because it seemed to me that whilst he was talking, and talking very nicely, about stretchers with telescopic handles, and drawing fine distinctions between patterns of ambulances of infinitesimal shades of difference, he did not in the least give indication that he realized the probability of what it seems to me will be a likely occurrence in the next war—which I hope he will not live to see, for surely none of us want to see another war—namely, that, probably, about the second evening after the battle, if he should be on the field, he will probably find a wounded Brigadier-General competing eagerly for the ninth share of a country dung cart for his conveyance to the field hospital. I regard that as no strained illustration of the state of things that will exist in the future after a great battle, in

consequence of the immense number of wounded which the altered conditions of military armament will bring about. It may be, however, that Surgeon-General Bardeleben, of the German Army, is right, when he anticipates that there will be no wounded any more, and in his cheerful conviction that the new missiles will kill everybody outright. In that case, *cadet questio*, there is no more to be said; Mr. Furley himself will be disestablished; there will be no more occasion for any Medical Staff Corps, and the stretcher companies will find their occupation gone, and will have to content themselves with serving as burial parties. Personally, I venture to think that the battle of the future will not be so thorough in its destructiveness. My own idea is that, while the mortality will undoubtedly be greatly heavier, the number of wounded, both actually and proportionately, will be increased to an unprecedented and most ghastly and overwhelming extent; and that there will be no possibility of overtaking the work of prompt attention to them by any method or methods whatsoever. Since the attempt to remove wounded men from and behind the fighting line within range of fire would result in the wreck of the bearer organization in the first battle of the campaign of the future, no alternative can be hoped for, but that the wounded of both sides will have to lie where they are struck down till the battle is over. What will be the result of that? The vanquished will depart. He must leave his wounded on the field, for the simple reason that he cannot take them away. They will pass then into the possession of the victor. He will have his own wounded on his hands, and he will have also on his hands the wounded of the vanquished who has gone away. This, in itself, is no new thing; it has, indeed, been a practice of war ever since the beginning of that strange anomaly and contradiction in terms which we choose to call "civilized warfare." But the conqueror of the future, if he accepts the conventional burden, will become its victim. He will not accept it. He is in the field not to be a hospital nurse, but to follow up his advantage by hammering on the enemy, who has walked away jauntily, leaving his wounded behind him, and who may come back again to-morrow to strike him while clogged in the live and dead *débris* of the yesterday's battle. Do you imagine for one moment that the victor, in such circumstances, will think twice even about his own wounded, let alone the wounded on the other side? No; he will march away to overtake the vanquished, and will leave the wounded of both sides to the ministrations of Mr. Furley and his fellow-philanthropists of all countries, to whom it is hoped—although the hope is chequered by misgiving—that facilities for being available, in such an emergency, will be afforded by the belligerents. That is what, as regards the wounded, I believe will be the future of the next great campaign. It seems a very disheartening prospect: yet there may be features of it tending to mitigate its gloom. I venture to think, for instance, that the enforced remaining of the wounded on the battle-field until the battle is over, and for hours, and even for a subsequent indefinite period, notwithstanding the sufferings such delays must inevitably entail, will not produce consequences so calamitous as may be not unnaturally apprehended by those who "sit at home at ease." I believe, and I speak out of my own personal experience, that the severely wounded man, under the existing system of prompt removal to the dressing station, does not uniformly benefit by the hustling his removal inevitably entails, while he is suffering from the first shock of being wounded. I think that, in many cases, it would be wiser and better to leave him to "stew in his own juice" on the field, for a few hours, until he congeals—till he ceases to bleed. Of course he may have bled to death in the interim, if no ministration has been afforded him where he lies; but if he has got plugged up, and is in fairly good case, I think that he can lie without serious detriment—perhaps, indeed, with actual advantage, even for so long a period as twenty-four hours. Most all men conversant with war know instances of extraordinary tenacity of life in wounded men who had received no attention. Segur's story of the man wounded at Borodino having been found alive by the army retreating from Moscow has been somewhat discredited. But my comrade and myself found, on the fifth day after the battle of Sedan, a wounded man walking about in a sequestered part of the field, not, indeed, with sprightliness, but without evidencing great debility. His lower jaw had been shot away, yet he was still alive, in spite of this ghastly wound untended for five days—a wound, too, which precluded him from eating solid food.

I found also, on the third day after the battle of the 30th November, on the east side of Paris, in weather so bitter that sentries were actually frozen to death at their posts, a little nest of three wounded men lying, fairly snug, in a little hollow, not starved to death, not frozen to death, pretty hungry, but quite alive, and, as far as I know, they are alive still. And I make bold to aver that such men as Mr. Furley, and I should even say the President of this meeting, as a type of the military branch of the medical profession, are responsible, to my thinking, for doing the wounded soldier of the period—the contemporary soldier of all nationalities—a considerable deal of harm. He is coddled, now-a-days, to the extent that he really is deteriorated by over-tenderness of treatment. He has an anæsthetic administered when the top joint of his little finger is being taken off; he has hypodermic injections when he has a twitch of pain; he is treated with champagne, with all sorts of delicate extras, and everything that can make a man reluctant to own to convalescence. In the old days of the Peninsula and the Crimea, men had natures of more pith, and yet did not seem to die in much greater proportion than now-a-days, although they were entire strangers to all this demoralizing excess of dry-nursing. It is probably in the memory of most of you, that the late Sir George Napier was shot down in the breach at Ciudad Rodrigo while heading the storming party. He was made a football of for about a quarter of an hour, while the column passed over him as he lay. He was picked up with his arm smashed. Lord March tied a sash round it, and bade him go and find the amputating place. He spent about an hour in the search, and then sat down at the end of a *queue* of men to wait for his turn, which came two hours later. Then there was a dispute between the surgeons on a point of etiquette. Napier had asked his own regimental surgeon if he was wounded to do the needful; but there was a superior surgeon present, in the well-known Guthrie, who asserted his right to amputate Napier's arm, and the regimental surgeon had to give way. The operation took twenty-five minutes, Guthrie's instruments being blunted by much use. During that period Napier cursed Guthrie by all his gods. The arm was bandaged up, and he was told to go away and find quarters. He walked about in this quest for a great part of the night, when he found a house at last, in which a considerable number of other wounded Officers had gathered, and he remained there, sitting by the fireside, with his stump taking its chance, for a considerable time longer, until the death of the Chairman's namesake—the gallant General Crawford, of the Light Division—left a bed vacant for Napier. At Redintra, Napier, then a Captain, was again wounded—all the Napiers were always getting wounded—and he was carried back 7 miles to the rear. In the evening there arrived a soldier of his company, who had been searching for his Officer for several hours. Napier said to him: "I am very glad to see you; but, John, you are wounded yourself; your arm is in a sling." "Arrah, your honour," replied the stout soldier; "sure its nothing to spake about—only me arrum cut off below the elbow, just before I started to look for your honour!" There is the kind of man for you, if you like; not the shambling creature, of whom you have too much now, whom you dose with cocaine and chloroform, and pamper with port wine and preserved delicacies. I think, perhaps, that even under the future conditions of the fighting, even when the field is being swept by fire, so that bearers could not live, it may be possible to do something for the worst wounded as they lie—I mean those who are lapsing into syncope, either from loss of blood or from shock. Doctors are too precious for such a service; but there might be attached to every company a couple of specially trained Medical Staff men—a sergeant and corporal—supplied with simple things in a wallet, who should move about among the wounded as they go down. They would be no more exposed in this service than if they were in the ranks, and their duties would be, of necessity, uncomplicated—simply to take concern with the gravely wounded—administering here a tot of brandy, there applying a bandage. It is astonishing what simple appliances are often effectual. In the Kyber Pass I once adjusted a tight bandage on the wound of a man shot through the thigh, obtaining the compression by clapping a round stone in each orifice under the bandage, and at the end of a 20 miles rough journey in a dhooly, he had not lost a drop of blood. I think the next campaign will see the last of the existing bearer organization, now in the German Army amounting to 1,000 men to each army corps. An army of six

corps would then receive an accession of a brigade of fighting men, and what a comfort that will be to the General instead of 6,000 bearers, whose organization would be wrecked in the first battle. It seems to me that, apart from their inevitable destruction, bearers can the more easily be dispensed with in the future, since the battles will probably be shorter than in the past; and that immediately a battle is ended, reserves, which will not have been engaged, will generally be available for the mere mechanical duty of picking up the wounded and conveying them to the dressing stations.

The CHAIRMAN: I would ask you to let me say two or three words. In the first place, with regard to the paper generally, I think we are very much indebted to Mr. Furley for the extreme pains he has taken to put on record his views, many of which are not only practical, but very important. It is also very satisfactory, I think, to this Institution to be able to command the services of such a gentleman as Mr. Furley, who writes papers that are worthy of its Journal, and those papers go out to the Services generally, and from them we derive great advantage. I beg to propose that you thank Mr. Furley for the great pains he has taken in drawing up this paper, and reading it to us; and in doing so to thank those gentlemen who, like Mr. Forbes, have given us reasons for supposing that in future wars we shall not have, perhaps, so many wounded, but a great many more killed, and therefore doctors will have less to do. My own impression is that in future you will find public opinion so strong that unless the medical department, and the other departments entrusted with the charge of sick and wounded, are quite capable of taking care of them, and of bringing them early under treatment, the public will be down pretty heavily upon that department. I know in the late Egyptian campaign, a quarter of an hour was held to be the extreme length of time for the wounded man to be on the field without getting relieved. What will it be when you have thousands, instead of a few hundred soldiers to deal with? I will ask you to thank Mr. Furley for the very able paper that he has read to us, and in giving this vote of thanks, I will also give him an opportunity of replying to anything that has been said during the discussion.

Mr. FURLEY: The hour is so late that I do not propose to make any detailed reply. I can only congratulate myself that my paper has led to such a very interesting discussion. I think I have been misunderstood on two or three points. My friend Sir Vincent Barrington referred to the cacolet, and the use it is in the Alps. If he looks at my paper he will find that in my objections to it I particularly excepted mountains. Cacolets are, unfortunately, still necessary in mountainous countries. Then, again, with regard to the folding stretcher. I do not myself approve of such stretchers if the ordinary stretcher can be used, but when distinguished Officers at the War Office say they must have such things, it is a pleasure to me to try and meet the want, and therefore I have tried for a long time to produce a good folding stretcher. If Sir Vincent will refer to my paper, I think he will admit that he also quite misunderstood my remarks on improvised matériel.

Friday, July 1, 1892.

LIEUT.-GENERAL E. H. CLIVE, Governor Royal Military College,
Sandhurst, Member of Council, in the Chair.

THE FRENCH MANŒUVRES OF 1891.

By Major G. F. R. HENDERSON, York and Lancaster Regiment
(Instructor in Tactics, Military Administration and Law, Royal
Military College, Sandhurst).

THE French Autumn Manœuvres of 1891 are undoubtedly to be reckoned amongst the more important military incidents of late years. Four corps d'armée and two cavalry divisions took part in them; and although I believe even larger bodies have been assembled in Russia for a similar purpose, this was the first occasion on which so large a force has been brought together in peace-time, and all Europe granted leave to judge for itself the efficiency of the troops for war. Still greater interest attached to the occasion, since it was the first appearance of a French Army, properly constituted, since the dark days of 1870 and 1871, and I think it was generally felt that a fair opportunity was offered of comparing the soldiers of the Republic with their ill-fated predecessors under the Empire. I have never ceased to congratulate myself that I had the good fortune to be able to attend the manœuvres, although in an unofficial capacity. Not only was there a good deal of dramatic interest attending the great gathering with which the French Government marked the coming of age of the Republic; not only was the spectacle, favoured by glorious weather and with magnificent country for its theatre, brilliant in the extreme, but no soldier can see 110,000 troops marching and manœuvring for several days in succession without enlarging his ideas and acquiring much useful information. Nor was there the slightest difficulty made as to spectators seeing everything that was to be seen. Everything was perfectly open and above-board; our small party of six English Officers was permitted to move about wherever we pleased; and all ranks of the Army, from the Generals downwards, were most courteous in answering questions and giving information. Moving thus freely over the field, standing alongside the batteries in action, going forward with the firing line, accompanying the regiments on the march, and talking to the Officers on picquet, we had a most excellent opportunity of studying practical tactics, and also of obtaining an insight into the interior working of the units, the

discipline, the endurance, and the mobility of the troops, and also into the relations between Officers and men.

It is because we had this opportunity, that I think the impressions made on English regimental Officers by the work and appearance of the French Army may prove interesting to some of you. We inspected the troops so thoroughly, that, despite our lack of experience, I do not believe that we carried away many erroneous ideas.

I have no intention of comparing the French Army with our own or any other; even were I competent to do so, I doubt whether such comparison would serve a useful purpose. Still I shall not confine myself strictly to describing what I saw. There is a comparison which may be fairly made—one which, to my mind, is of equal interest and importance—and that is, a comparison between the French Army of to-day and that which we knew long ago—the Army which lost all but its honour in the autumn of 1870. The constitution and the faults of that Army have been very thoroughly exposed. Every student of war, soldier or civilian, knows them by heart, and I ask you to recall the Army of 1870 when I describe what I saw in 1891.

My experience has been, in discussing the Republican troops with both soldiers and civilians, that many have forgotten that twenty-one years have elapsed since Paris fell, and that very few have paid attention to the great changes in organization and in training which have been made in the military system of France. It is surprising how few men you find who realize that while the old Imperial Army was a professional Army, composed of men who, however gallant they may have been, were certainly not men of high class, the Army of to-day is the nation in arms, recruited from every grade of society, and with thousands who boast the best blood and the oldest names in France serving as privates in the ranks.

Universal service, very strictly enforced, and the abolition of the system of substitutes, has entirely changed the character of the rank and file, raising the average of intelligence, and promising a stricter sense of discipline and duty than existed in 1870.

The country handed over to the troops from the 3rd to the 18th of September is that district of Champagne which is watered by the Aube, the Marne, and the Seine, a district already famous in the annals of war, and containing within its boundaries the military school where Napoleon was educated, and many of the battle-fields of 1814. The tract actually occupied is in the shape of a triangle, of which Vitry-le-François, to the north, is the apex, and a line running from Troyes to Chaumont the base. The distance from Vitry to Troyes and Chaumont is, roughly speaking, about 60 miles, and from Troyes to Chaumont the same, the area of operations containing 3,600 square miles, a tract a good deal larger than the county of Kent. This country is admirably adapted for manœuvres, the most striking feature being the great rolling downs, the great forests, and the magnificent roads. With the exception of Troyes, there is no considerable town; the ground is undulating, with neither natural nor artificial obstacles to the free movement of all arms, and everywhere

two most important military requisites are to be obtained—wide view and long range. The cavalry and artillery are as well served as the infantry, and no better theatre for the movements of large bodies could be imagined. The only objection is the want of water; brooks and wells are few and far between, and the drainage of the country appears to be confined to the rivers. The soil does not admit of much cultivation, and even the vineyards are by no means numerous. As usual in France and Germany, there are few walls or hedges except immediately round the farms and villages, and these are at wide intervals. As regards minor tactics, therefore, the ground was too open to give much scope for adroit skirmishing or skilful handling of small bodies of troops, but the long ridges, the deep valleys, and the extensive forests enabled the commanding Generals to find plenty of cover for their masses, either when approaching the enemy or when defending a position.

The manœuvres proper commenced on the 3rd of September, but the reservists were called in and joined on the 1st, and many of the regiments had been marching for several days before they reached the seat of war.

The corps engaged were the 5th, 6th, 7th, and 8th, of which the three latter are permanently quartered on the border, and constitute the frontier guard of France. The two divisions of cavalry, the 1st and 5th, were each composed of three brigades of two regiments, one of cuirassiers, one of dragoons, and one of light cavalry, hussars or chasseurs. To each cavalry division were attached three batteries, and to each corps d'armée no less than twenty, that is 120 guns on a war footing, six being assigned to each division. There is here a remarkable increase since 1870. In that year the French corps d'armée took the field with twelve field batteries instead of twenty, as now, and each division with but two field batteries and one mitrailleuse instead of six field batteries.

To each corps d'armée was attached a light cavalry brigade of two regiments.

Another peculiarity of organization were the two provisional brigades, one of chasseurs-à-pied, and another of marines. Of chasseurs, or rifles, as I may call them, there were seven battalions, brigaded together, and of marine infantry the same. There were also three marine field batteries.

Of the strength of the various units it is not necessary to say much.

The infantry battalions seldom numbered more than 600 bayonets; the cavalry about 100 horses per squadron; and the batteries each four guns and three wagons, with the exception of the horse and marine batteries, which had a full complement. An interesting point is the number of the reservists. Of course it was impossible to detect from personal observation how many of these were in the ranks, but I gather from various sources that, on an average, there were about 200 per battalion.

The marine reservists had also been called up, and their battalions were rather stronger than those of the line.

The course the manœuvres took was as follows:—

The 5th Corps d'Armée, concentrating about St. Rémy to the south, manœuvred against the 6th Corps, concentrating at Vitry, 30 miles to the north-east. On the 2nd of September the reservists arrived; on the 3rd the troops moved forward, and on the 4th the two forces fought an action at Aulnay, on the Voire, some 20 miles distant from the localities of concentration.

On the same date the 7th and 8th Corps met at Mont Saon, near Chaumont.

On the following day, the 5th of September, the 5th and 6th Corps joined hands, and passed under the command of General de Galliffet, in order to manœuvre as an army against the 7th and 8th, who had united under General Davout, and the Headquarter Staff, General de Saussier and his Chief of the Staff, General de Miribel, took over the supervision of the operations. The two armies moved forward on the 5th, each marching some 30 miles, and after a cavalry fight on the 5th, and a day of rest on Sunday, the 6th, met in battle at Colombey-les-deux Églises on the 7th.

On the 8th General de Galliffet, re-crossing the Aube, was pursued by General Davout, and on the 9th was fought the action of Vendevre, at which M. de Freycinet, Minister of War, and the foreign Military Attachés were present.

This action ended the second period of the manœuvres. On the 11th, after a day of rest, the two armies combined, under the command of General de Saussier, moved against a masked enemy, composed of the provisional brigades of chasseurs and marines, 14 battalions, 9 batteries, and 12 squadrons.

The night of the 12th saw the passage of the Voire; and on the following day, the 13th, the four corps moved in a north-westerly direction, disposed in square, so as to be ready to meet attack either in front or flank. On the 14th the marked army was defeated at Margerie-Hancourt. On the 15th the pursuit was taken up, and the troops reached the vicinity of Vitry, where, after a day of rest on the 16th, the manœuvres terminated on the 17th by a march past of the whole force before the President of the Republic. This programme, starting from September the 3rd, of 14 days' work gives 12 days of marching and fighting to 3 days' rest and 1 day for the march past. The 6th Corps, which originally concentrated at Vitry, returned thither for the final review, having traversed in the 12 working days about 110 miles, and been engaged in five actions.

As to the strategy of the manœuvres little need be said. The general ideas were issued with the object of bringing the opposing forces into contact on pre-determined battle-fields, and not one of the Generals had any opportunity of displaying his skill in manœuvres outside the battle-field. There is no doubt that this circumstance deprived the operations of much of their interest, and the War Ministry has been severely criticized, in France as elsewhere, for thus tying the hands of the leaders, and confining their efforts to the handling of their troops in action. But it must be remembered, first, that the assembling of 100,000 men was an experiment; secondly,

that Champagne is a poor country, lacking in both supplies and quarters; and, thirdly, that the object of the manœuvres was to test the capacity of the Staff in handling masses of men under normal conditions.

The question of supply, moreover, grows in importance and in difficulty in proportion to the number of troops engaged, and side by side marches the question of expense. In the first place, it may be noted that the ordinary railway traffic in the district was not interfered with during the manœuvres; secondly, that long notice was required to enable the village authorities to accumulate the supplies that were requisitioned; and, thirdly, that the sum voted for the annual manœuvres amounted to 230,000*l.* sterling.

At the same time, the existence of a programme, worked out long beforehand down to the minutest detail, and known to all engaged, not only deprives us of an opportunity of determining the strategical skill of the Generals, but of judging the real efficiency of the Staff, and it must be borne in mind, however remarkable the smooth working of the latter may have appeared, that it was not very highly tried. On the field of battle the restrictions of the programme were less felt. The Generals had indeed little choice of positions, and little latitude as to lines of attack, but this is a disadvantage which is conspicuous by its presence in actual warfare. A General is more often called upon to show his skill in making the best of a bad position than in selecting a good one, in attacking a strong line than in finding out a weak point. The grand tactics, therefore, of the manœuvres, comparatively unfettered as they were, can hardly fail to be of interest, and I will try and put them before you from a general point of view.

To begin with the process of taking up contact. Here there was no departure from normal procedure. When corps moved against corps both were screened by their cavalry brigades; when army moved against army the cavalry divisions led the advance; but, as regards the working of the screen, the short distance apart at which the opposing forces started, never more than 40 miles; the exact knowledge of the enemy's point of concentration, his line of advance, and the locality of the engagement that must ensue, undoubtedly robbed the cavalry of much instruction, and were by no means productive of an excess of zeal or interest. Still the work was done on the usual lines. Officers' patrols scoured the roads, and the brigades or divisions always came together in orthodox fashion during the day preceding the general engagement. The infantry and artillery, meanwhile, covered by strong advanced guards with batteries well to the front, occupied their assigned cantonments, and the cavalry drew off to the flanks, leaving the scouting between the opposing lines to be done by the divisional cavalry or infantry patrols. But when once the troops were in position, although invisible to each other, there was very little of this kind of work done; and, except from an instructional point of view, it was unnecessary. There was no further information to be gained. The battles, as a rule, began with a prolonged artillery engagement, often at rather long ranges,

between 3,500 and 4,500 yards. The artillery, without special escort, was employed in masses, wherever the ground permitted in two tiers, and came into action by groups of three batteries. While this preliminary was taking place, the infantry was deploying for action under cover of the woods and undulations. This deployment was a long process, much attention and supervision being given to the ordering of the successive lines before they were permitted to advance, and until all was ready for their movement, the front was covered by strong points in the intervals of the artillery being held by the *chasseurs-à-pied*, and the battalions of the advanced guards. During this stage, the engagement was usually confined to the artillery; there was little skirmishing, both sides appearing to rely on the rapid and impetuous attack of a large mass drawn up at the outset in good order, and to discourage minor enterprises against the outlying posts of the defence. The destruction or driving in of such posts was generally left to the artillery.

I here speak of both sides, for very often both sides assumed the offensive, the next stage of the battle being an almost simultaneous advance of two of the opposing wings. This double attack was a curious feature, and indicates, I venture to think, that the mainspring of the French tactics of to-day is the offensive, a very different idea to that which prevailed in 1870. Of course, in such a proceeding, one side, favoured either by the ground or by deploying more rapidly, seized the initiative, and threw its opponents on the defensive. But even under these circumstances the doctrine that safety lies in attack soon asserted itself, and whenever the assailants' advance was checked a strong counter-attack was made by the wing hitherto unengaged, this movement being made with the same order, precision, and strength as that which initiated the battle. During the infantry fighting, the cavalry brigades worked with their own corps, a very short distance in rear of the fighting line, whilst the divisions manœuvred against each other on the wings, or as at Vendevre, the most important battle, charged the flank of the advancing infantry.

The engagements began about 8 o'clock in the morning, and the cease fire was ordered by the Umpire-in-Chief when the infantry had come into close contact all along the line, generally about 1 o'clock. Such were the main features of the grand tactics. First, the concentration of the cavalry divisions forming the screen; secondly, the employment of the artillery in masses; thirdly, the energetic attack of a large mass, moving in a body against the tactical objective; and, fourthly, the constant tendency to assume the offensive.

I may notice that this tendency is likely to prevent one of the commonest faults committed by the Generals in 1870, that of submitting to the attack of an unsupported advanced guard, without making the slightest attempt to destroy their audacious antagonist. Over and over again I noticed constant endeavours to test the strength of the enemy's advanced guard, which, had there been no supports at hand, would undoubtedly have been converted into energetic attacks.

I will now speak of each arm in detail, and here I shall make free

use of the letters written to the "Times," by their correspondent at the manœuvres.

First, the artillery. I have already spoken of the large number of batteries attached to each corps d'armée, thirty-six more guns than in our own organization, and for a long time it has been well known that this powerful arm has reached a high state of efficiency in France. It is well horsed, manœuvres with precision, if not with rapidity, is well officered, and the men are of superior physique to the rest of the army.

To its employment in masses and in two tiers, wherever possible, I have already alluded, and, so far as I could see, the positions were generally judiciously chosen. In the engagement against the marked enemy, General de Saussier deployed forty batteries, representing, had each battery been equipped at war strength, 240 guns, in a single line between his two armies, and at Vendevre I counted twenty batteries in mass on General de Galliffet's left. That there were mistakes made in selecting positions goes without saying, but the instances that came under my notice were rare, and it was impossible not to notice the order, regularity, quiet working, and good drill everywhere visible. The batteries were each accompanied by three wagons, and each group of three by a fighting train. The fire discipline was good, and care was given to the laying, but, as has been said elsewhere by an English critic, the concentration of a large number of guns on a single target does not appear to be considered essential. However, this is a point on which it is very difficult to generalize; circumstances may sometimes compel an artillery Commander to assign to individual batteries targets which are far apart; moreover, I have never seen this question of concentration thoroughly discussed, and I think many Officers who are not gunners have somewhat vague ideas respecting it. For instance, when artillery is firing on a line of infantry advancing, it would scarcely be judicious, even were it feasible, for every gun in a long line of batteries to direct its fire on a single battalion. The battalion so favoured would possibly suffer, but the remainder would escape, and perhaps reach cover before their time came to play the part of target. There was one thing to be remarked concerning the taking up of position, and this is that the French disregard cover in favour of precision and steadiness. The batteries, even when unlimbering on ground already under fire, did so without the least attempt at hurry, and very often the teams and limbers were kept close in rear of the guns on open ground, notwithstanding the fact that there was cover to be found a few paces further back. Nor did I notice or hear of a single case in which guns were kept behind the crest and run up by hand; perhaps the weight of the piece may have something to do with this, but my impression is that this precaution is considered useless when batteries are employed in mass. They rely for protection rather on their own fire than on expedients which can seldom be more than partially applied.

The positions of the groups of batteries are always selected by the artillery leaders, and it is scarcely remarkable that the presence of three or four mounted Officers on any favourable spot should always

have warned the opposing infantry of what was to come. Even private soldiers were quite up to this proceeding, and directly the little group of Officers appeared one heard a murmur go down the ranks.

Smokeless powder, which was used for the second year in succession at the manœuvres, has brought about tactical developments of which the French have taken full advantage. Guns, especially when the batteries are posted on high ground, can fire over the heads of their own infantry, even if it is attacking, when it is almost at close quarters with the enemy; there is nothing to mask their fire; and again, when they have found the range, there is no need for them to change position, except to give the infantry moral support. On the defensive, the French gunners had this question of moral support well in view, and on several occasions I saw them holding their ground, when their own infantry were falling back, until the assailants had got within 1,200 yards. When necessary, also, that is, when the ground masked the objective, they showed no hesitation in pushing forward to close range.

Naturally, as an infantry Officer, with little more than theoretical knowledge of the other arms, I speak with diffidence on the question of artillery. I can only describe what I saw myself, and it is possible that many faults were committed which escaped my notice; but, for all that, when we recall how infinitely inferior the artillery of 1870, both in tactics and matériel, was to the Prussian artillery, we cannot fail to realize the enormous strides that have been made in both directions by the French artillerists since that date. How bad the artillery of 1870 was very many people have not yet realized; how good are the batteries of 1892 only the test of war will reveal, but we may be sure that the balance will be far more even.

Smokeless powder, as used by masses of artillery, does not do much to render the guns less visible. There are always bright, white flakes of flame which immediately attract attention, and on dry soil the cloud of dust driven up by the explosion is always seen from a long distance. It is more difficult, perhaps, than heretofore to count the number of batteries in opposition, but the dark line seems to offer a fair target, and the burst of the shells might be more accurately observed.

Two batteries of howitzers, 12-cm., were employed at the manœuvres. These guns fire melinite or melinite and cresylite shells; heavy as they are, with huge glycerine brakes, they moved across country, and are likely to be far more efficient than the mitrailleuses, now discarded, on which so much dependence was placed by the last Napoleon and his military advisers.

Of the cavalry, again, I have to speak *en amateur*; and in this case I had but few opportunities of seeing the working of the arm in action. Where positions are of great length, 6, 9, or even 12 miles, and the squadrons manœuvre well out on the flanks, it is impossible for the ordinary spectator to see much of the cavalry unless he attaches himself to it permanently, and even then it is often possible that the day may pass by without an opportunity for its action.

However, on the march and in cantonments I saw a good deal of the mounted arm, and on several occasions I hit off the advanced patrols and contact squadrons. Whether their work was well done or not it is impossible for me to say. The Officers' patrols in France as a rule do not consist of more than two or three troopers, and where the front of the armies is very wide, 10 or 12 miles, for instance, the spectator who finds himself at some particular point between the two armies can be no judge as to whether the country is properly patrolled. I noticed, however, when the armies were in motion towards each other, that posts of about half a troop, who sent out vedettes and patrols, were established on the main roads. When the armies had reached striking distance the cavalry was seldom to be seen within the opposing lines, but I do not know that it would have done much good in such a position.

There are plenty of commanding heights in Champagne, and a Staff Officer, taking post on one of these in perfect security, could see as much as a whole regiment. At the battle of Vendevre some pretty scouting was done on de Galliffet's left, and both sides were covered by contact squadrons. Here, however, there were no commanding heights, and the view was limited from almost every point.

The French recognize the distinction between the two services of exploration and security. To the independent divisions is entrusted the task of leading the advance, dealing with the enemy's main body, and ascertaining the dispositions of his armies, whilst to the brigade of cavalry attached to every corps d'armée is assigned the service of covering the march. In the present manœuvres the independent divisions came but once into conflict. This was on the 5th September, whilst Generals de Galliffet and Davout were marching to meet each other. For this encounter I unfortunately arrived too late, but a full description appeared in one of the French military papers, of which the following is a brief summary :—

The two divisions on the morning of the 5th both advanced with the intention of occupying a hill near the village of Colombey-les-deux Églises, this hill being a most important point, commanding the surrounding country and the key to several good roads.

The 5th Division reached Colombey first, and occupied the hill with its three batteries of artillery and a dismounted squadron of dragoons. Two contact squadrons pushed well to the front, one of which acted as escort to a section of sappers sent forward to block the high road through a village, soon reported the approach of the enemy, moving over a high ridge, about $2\frac{1}{2}$ miles distant. The 1st Division, here discovered, had no less than five batteries, two having been added from the corps artillery by General de Galliffet. Then ensued a rather long artillery engagement, during which a battalion of chasseurs, which had marched 6 miles in fifty-four minutes, relieved the dismounted dragoons and secured the occupation of Colombey. The 5th Division then rode forward in order to lure its adversaries down from the heights opposite, and the 1st Division, leaving a dragoon regiment to escort the batteries, left its cover to meet it. Both

divisions tried to gain each other's flank, and both attacked in three lines, a brigade in each. The 5th Division exposed its flank to the five batteries on the ridge, and its second line was charged by the dragoon regiment which had been left as escort to the guns. The three batteries of the 5th Division changed position three times during this action; those of the 1st remained on their commanding ridge.

The 1st Division, whilst manœuvring to gain the flanks of the 5th, covered about $2\frac{1}{2}$ miles at the trot and gallop.

On the 7th, the day of the first battle, the two cavalry divisions found themselves some 7 or 8 miles in rear of the right flank of General Davout's army. Here there was very little cavalry fighting beyond a charge or two in extended order against infantry, and a dismounted attack of the 28th Dragoons of the 1st Division on the village of Blaise. Another village was occupied and barricaded by squadrons of the 5th Division.

On the day of the battle of Vendevre, the 1st Division, covering the right flank of the army to which it belonged, drove back a cavalry brigade, and then, reinforced by a corps brigade, twice charged the attacking infantry in flank. The 5th Division, on the opposing side, was employed at first on the other flank. It first held a village until the arrival of the infantry, for which purpose four squadrons were dismounted and occupied the border of a wood. It was then sent over to the other wing, but, having to traverse about 16 miles of difficult country, it did not arrive till the action was over.

On the 11th, during the advance against the masked enemy, the two divisions, now on the same side, moved in advance of either wing, the 1st Division being kept together on a single road, with Officers' patrols over a wide front, the 5th working in two columns. The front covered by the twelve regiments was about 30 or 35 miles.

On the 14th the two divisions were united, and attacked the enemy's cavalry in mass, the artillery (six batteries) being divided in two groups on the flanks. The divisions were reinforced by a corps brigade, and the whole force numbered fifty squadrons.

In France, as elsewhere, a great deal of adverse criticism has been showered, not so much on the French cavalry as on the cavalry Generals, and it is said their action or inaction by no means received the approval of the supreme authorities. This is a point on which I can say nothing. We have not heard the defence of the accused. It has been said that the cavalry missed many opportunities. But the cavalry cannot be everywhere, and when the front of battle extends to 7 or 8 miles it is manifestly impossible that it should be able to seize every opportunity that offers. I can only say that there appears little reluctance to use the cavalry boldly in the very heart of the battle, but it is very possible that the fact of the mounted arm being very seldom employed *en masse* at the manœuvres of the other arms deprives its leaders of all opportunity of gaining experience in combined tactics.

As to the general appearance of the arm, I should say that it compares well with other European cavalry. It is well horsed, on the

whole, though somewhat uneven in this respect, and the cuirassiers are under-mounted. The improvement in riding is very marked, and the divisions manœuvred easily and rapidly when *en masse*. The dragoons are armed with lances, but their brass helmets and the bright cuirasses of the heavies are exceedingly conspicuous, catching the sun at a long distance. The light cavalry, the chasseurs, look more workmanlike, both horse and man, than either, and their plain sky-blue uniforms are well adapted to field service. No horses under six years old are allowed in the ranks, but as the peace strength of the regiments, as in Germany, is greater than that for war, the ranks are not thereby attenuated. I noticed a good many sore backs, principally amongst the corps cavalry, and in all probability due to the unsparing use of the men as orderlies by the infantry commanders.

On the whole, the work done by the cavalry cannot be said to have been very heavy, but the distances at which the opposing armies were placed apart was small. Nevertheless from 30 to 40 miles per diem were often travelled by the divisions.

There are one or two points in connection with the cavalry which call for special notice. France has no mounted infantry, but she evidently intends to supplement the fire capacity of her horsemen. There were ten chasseur or rifle battalions engaged in the manœuvres, and the majority of these, at one time or another, were employed in support of the cavalry. These troops, perhaps the most highly-trained in the army, are magnificent marchers, equalling the Bersaglieri in rapidity of pace and also in endurance. I have already told you how the 5th Cavalry Division, at Colombey, was supported by a battalion which marched 6 miles (the packs being carried in carts) under the hour, and in all the cavalry operations these auxiliaries were used to hold important tactical points, and to set free the horsemen for the shock. At the same time, as you will have noticed, the cavalry is considered capable of fighting on foot, and of attacking on foot too.

I come next to the infantry, and I may say at once that I do not think any infantry Officer present at the manœuvres can speak of the French infantry soldier otherwise than in terms of the highest praise. The men showed so much steadiness and endurance, they were so cheerful and good tempered, even at the end of long and tiring days, they marched so well under their heavy packs (weighing about 50 lbs.), and they looked so like fighting, that it was impossible not to admire them. On the march, the men wear the long blue-grey *capôte*, with the skirts doubled back, the *képi*, and boots of much the same pattern as our own, with a broad sole and a low heel. In addition to his necessaries, each man carries his share of the cooking apparatus belonging to his squad, a bundle of firewood, a light entrenching tool, and a section of the *tente d'abri*. In the pack itself are carried the two days' emergency ration, a pair of white spats, and a pair of stout hobnailed shoes, and on the top of the pack is the shell jacket, worn in camp and cantonments. The shoes, spats, and jacket have to be put on immediately the companies dismiss after the day's work; and this is a most practical regulation, for the

man is not only benefited by having to change his boots, but he has also an opportunity of looking to his feet and to his socks, or to the greased rags which many of them wear in lieu. The French soldier needs little urging to induce him to look after his own health and comfort. Directly billets were taken up, the men might be seen inspecting their clothing, repairing rents, looking to their foot gear, and generally getting their kit into order for the next day's march. This habit has, doubtless, something to do with the excellent marching of the battalions, but it is very evident that much attention is paid to their training in this most important particular. The weather during the manœuvres was very hot, the thermometer sometimes reaching 95°, and even more; the marches were long, varying from 15 to 30 miles, the engagements were numerous, and the work, with the exception of the outpost duty, heavier than would generally be the case on actual service. And yet there were two points by which I was particularly struck: the few men who fell out, and the way in which the sections of fours kept closed up even at the end of a long march.

The marine brigade had a large number of casualties, but the ambulances attached to the infantry battalions, so far as my personal observation went, were never over-crowded, and were very often empty.

Discipline on the march was strictly maintained, and I think that as regards mobility, the French infantry of to-day is in advance of that of 1870; I might say very far in advance if I did not believe that the popular opinion as to the want of endurance amongst Napoleon's troops is based on insufficient evidence. The French armies, at the outset of the war, moved slowly enough, but this was due, I believe, rather to Staff mismanagement, such as delayed the passage of Bazaine's troops through Metz before the battle of Vionville. Of course the march to Sedan was an utter breakdown, but by that time, to quote the official account, "successive defeats, continuous retreat, and maladministration had utterly destroyed the *morale* and discipline of the troops."

The attack formation of the French infantry is the next point I come to, and it is one, I think, which merits attention, as it has certain marked peculiarities. The advanced guards, under cover of which the marching columns approach the enemy's position, are strong, especially in artillery, three batteries being detailed to the normal advanced guard of a division; and under cover of this screen the army corps deploy for attack as single units; I mean by this, that the whole twenty-four battalions move forward simultaneously, formed in three lines. The battle does not therefore proceed, as was generally the case in 1870, by a gradual reinforcement of the advanced guards; there is no strengthening the screen by driblets; but the attack takes the form of the advance of a mass of troops disposed on a narrow front and with great depth. In fact, the attack is made very much on the same broad lines as were the assaults of our own army in the Peninsula and at the Alma. I may recall to your memory Wellington's counter-stroke at Salamanca, when "he

observed," says Napier, "with stern contentment that the French left wing was entirely separated from the centre. The fault was flagrant, he fixed it with the stroke of a thunderbolt. A few orders issued from his lips like the incantation of a wizard, and suddenly the dark mass of troops which covered the English Hermanito seemed agitated by some mighty spirit; rushing violently down the interior slope of the mountain, they entered the great basin amidst a storm of bullets which appeared to shear away the whole surface of the earth over which they were moving. The 5th Division immediately formed on the right of the 4th. . . . The 6th and 7th Divisions. . . . were ranged on a second line. . . . A reserve composed of the light divisions, Pack's Portuguese, &c., remained in heavy masses on the highest ground behind them all."

When I compare the French attack of to-day with Wellington's offensive strokes, I do not wish you to understand that the French infantry depend upon shock tactics for success. To break and demoralize the opposing infantry by fire-action is their primary object, and there is no division of the assaulting force into two bodies each with a distinct duty, the first line to do the firing, the second to use the bayonet. In fact, the main principles of their offensive tactics are identical with those which appear in the latest edition of our own Field Exercise, with the exception that very great stress is laid on the results to be expected from the simultaneous advance of a great mass of men on a single point of the line of battle. The deployment in three lines preliminary to the advance is made with much attention to distances and intervals, and hurry is carefully avoided. But at the same time, I observed no instances of undue delay, and on two occasions, when counter-strokes were made, the troops got into position very rapidly and in excellent order. In fact, the staff of the corps d'armée seemed perfectly familiar with the art of handling large masses as single units.

The deployment being completed, generally outside the extreme range of the enemy's artillery, the several lines move forward together, the first line gradually breaking up into smaller and smaller fractions; these fractions gradually extend, and the firing line gradually thickens, until at about 1,200 yards from the position, the whole front is covered by a screen of men in single rank, each squad of twelve or fifteen rifles separated by an interval from those right and left, and the men moving with plenty of elbow-room. Behind come the supports, generally in single rank, then the battalion reserves, and in rear again, the second and third lines, and in some instances, a fourth line, or general reserve. Firing, when on the offensive, began, as a rule, between 1,200 and 800 yards, and I never observed much delay in the advance until the decisive range—within 500 yards—was reached. By the time the firing line had reached this distance, the supports and reserves had closed up, the second line was near at hand, and the advance was continued by rushes of 60 or 70 yards. Supports and reserves were brought up, and magazine-firing commenced. The second line now came forward, and after a very rapid fire bayonets were fixed, and with drums

beating, and the men shouting "*à la baïonnette*," the whole line charged the position.

Such is the general aspect of the attack, and there are certain details which are of interest. In the first place, the English Officers present were specially struck with the good order and regularity of the whole movement. Until the moment just preceding the assault, the successive lines advance at a steady pace, every portion of the force preserving its proper interval, and the men keeping their dressing, not absolutely accurately, of course, but sufficiently to give the movement an appearance of strength and cohesion which was most effective. Little less remarkable was the absence of noise. Whistles and signals are used by the Officers, and shouting is strictly prohibited. Thirdly, the company Officers in the firing line were left entirely to themselves. All Officers dismounted when within long rifle range, and everyone, from the Commanding General downward, retained the same position during the whole of the manœuvre. As the "Times" correspondent says in his description of one of these attacks: "The whole mass moves forward steadily and silently, until, perhaps, 25,000 men are in view beneath us, covering the face of the country for a space of more than 2 miles in length, and 2,000 yards in depth. Scarcely a mounted Officer is to be descried: between the various columns there is no visible means of communication. There is no shouting of orders, no galloping to and fro. The huge mass of men advances, directed and animated by a single will; but this will is communicated by a hundred leaders, each working in combination with his fellows, and from the moment he parts company with his immediate superior, left to exercise the responsibility to which he has been educated."

So far the mechanism of the French attack seems well adapted to modern battlefields; but in several respects, very noticeable at the manœuvres, the requirements of active service seem to be sacrificed to an over-scrupulous regard for the niceties of the parade-ground. First, the importance of cover during the advance is a matter to which little attention was paid. It is true that cohesion and order are of equal moment, and if cover be the chief object of solicitude the attack will certainly lose in dash and resolution. But, at the same time, to neglect opportunities of avoiding the enemy's fire is to diminish the fire-power of the firing line and to reduce the strength of the lines that follow. I certainly observed very few instances of either the reserves or the second or third lines manœuvring so as to utilize the shelter offered by the folds of the ground, by coppices, or other natural features. When the men found themselves behind cover, it was intelligently utilized, but there was no skilful leading, and certainly no manifest effort to profit by the favourable accidents of the field of battle. As I have said, this consideration is made subordinate to order and cohesion, but we may remember that the French soldier has always been distinguished for individuality and intelligence, qualities which, since the days of the Revolutionary armies, have made him famous as a skirmisher. The celebrated memoir written by Prince Frederick Charles, long before the great war, on

the art of fighting the French, recognized these characteristics and taught the Germans how to counteract them; still, according to a recent German writer, these characteristics bore full fruit in the battles of 1870. A remarkable study of the Battle of Woerth, by a German Officer, Major Hermann Kunz, favourably criticized in the "Militär Wochenblatt," has been reviewed in the June number of the "Contemporary," by Colonel Lonsdale Hale, who thus sums up the judgment of the author: "Whilst claiming superiority for his own Army in the knowledge of field service among the rank and file, he points out that what is termed 'taking advantage of the ground' seems inherent in the nature of the French soldier, whilst the German finds the art difficult to acquire. Under fire, the tendency of the latter was rather to get near each other, as if for mutual aid and help, whereas the French relied each on himself to reach the required shelter." But, as we are aware, in the war of 1870, the bonds of discipline in the French Army had become relaxed, and it is possible that the authorities, straining every nerve to assure discipline in the Army of to-day, have decided to entrust to the natural aptitude and intelligence of the Officers and men the task of utilizing cover when they have to face the fire of an enemy.

Secondly, in the endeavour to maintain order, intervals, and distances, not only was cover disregarded, but there was a deliberate avoidance of all intermingling of sections, companies, or battalions, and this, if our own experience in the Crimea and those of both French and Germans in 1870 are of the slightest value, made the infantry attacks an absolutely unreal picture of what must inevitably take place on a modern battle-field.

The firing line, when a decisive attack is intended, must be maintained at full strength, and we know, from the history of the German campaigns, that in order to do this, not only company will have to be piled upon company, but battalion on battalion. Confusion is inevitable; but the French, unlike the Germans, seem to consider the task of organizing, or, at least, of minimizing, this confusion, hopeless; at all events, I observed no attempt to accustom the Officers and men to the embarrassments and perplexities of such a situation. During the last stage of an attack, the two opposing firing lines were often to be seen, standing in the open, blazing away at each other at 200 or 300 yards range, with the lines beautifully dressed, and the second line lying down a short distance in the rear. This certainly did not agree with either what I have read or seen of war. Of course, it is just at this stage that the unreality of peace manœuvres particularly obtrudes itself. Where there are no casualties, no gaps in the ranks, where the troops cannot approach within a certain distance, and where the decision rests on the fiat of an umpire, who, having to take many things into consideration and to receive many reports, may take a long time to make up his mind, the five minutes, beyond which those who have experience of breechloader fire tell us that the crisis of an infantry fight cannot be prolonged, easily run on to half an hour, and the situation becomes absolutely unlike anything that is likely to occur in actual battle.

In connection with the formation for attack is the question of fire-discipline, and I think that, however high the praise that their admirers may award to the French soldiers of 1870 for the skill they showed in making use of ground, the desperate tenacity with which they held their ground, the brilliant dash and precision with which their counter-strokes were executed, and the order in which withdrawals and retreats were carried out, no one can say a word in extenuation of the reckless waste of ammunition and absolute want of control in the firing line.

To-day, so far as the manœuvres teach us, the military authorities have introduced a remarkable reform.

Up to the crisis of the attack, the fire is by volley alone, and these volleys were never "ragged;" the men were well in hand, words of command clearly given, and ranges and objectives always indicated. The men, as a general rule, altered the elevation as ordered, but I think that the section and squad leaders, who gave the executive words, paid more attention to firing a good volley than to seeing that the objective was understood. So essential is it considered that every rifle should be fired simultaneously, that over and over again I saw men firing who could not possibly see the enemy, with a bush or a tree a few yards in front; and, in this respect, all exertion of individual intelligence is evidently sacrificed to the great end of maintaining the very strictest control and the tightest discipline. The position while firing was generally good, whether on the knee or standing, and the 170 rounds that the men now expend on the ranges is a very great advance on the meagre allowance issued—30 to 50 rounds—previous to 1870. Long-range firing, that is, at ranges over 900 yards, I seldom saw; but on several occasions, the supports and reserves, served by the undulations of the ground, fired volleys over the heads of the firing line. I may notice here that endeavours to turn the enemy's flank were almost too constant, a practice very different to the direct shock tactics of 1870. There are many other points, as regards the attack of the infantry, on which I should be glad to dilate, did the hour admit; but my time is limited, and I will only add one remark, which, perhaps, may serve as a useful warning to young Officers. We have been accustomed in England, every now and then, to hear a good deal about "drill and discipline." The words, coupled together, have been made the text of many an inspection oration; at all events, it has been impressed upon every Cadet, on his leaving Sandhurst, that they should be his watch-words during his military career. Now, the first thing that strikes one on seeing 110,000 troops deployed for action is how absolutely essential to an army, even on a modern battle-field, are steady drill and the strictest discipline. Until I saw 25,000 deploy for action in a very short space of time, it had never been so practically brought home to me what an important phase of an engagement such a deployment is, and how thorough a knowledge of close-order movements, what readiness in handling their commands, Officers of all ranks must possess, if it is to be effected without undue delay and the very greatest confusion. Again, the order, the quiet, and the precision of the advance

convey an appearance of strength which cannot fail to have its due effect, and I cannot but think that the strict discipline maintained by the French at every stage of the operation is in accordance with every teaching of history and experience. Of course fighting in an enclosed country at home would naturally bear a very different aspect to fighting on the great open and unobstructed spaces on the Continent. There, positions are clearly marked, the map shows them; here, even at Aldershot, it is extremely difficult either to guess or discover where the enemy is actually posted; and, while the work of the cavalry and advanced guards would be tenfold more arduous, a General would have the very greatest difficulty in knowing when and where to deploy his masses for a decisive attack. In fact, England is so thickly wooded, and so covered with hedge-rows, that the issue of a battle would depend more upon the intelligent leading of the firing-line, the use of cover, minor flank attacks, and the close co-operation of the battalion reserves, than on the simultaneous attack of an enormous number of men. It is well to bear this in mind when comparing our own with Continental tactics.

And there are other points connected with the French Army as to which we should be careful in making comparisons. National characteristics should never be ignored by students of war, and it would be unwise to set down the troops of another Power as inefficient because they pay little attention to matters by which we set much store. Englishmen who see the French and other troops in their ordinary garrisons, route-marching, on guard duty, or "walking out," are rather apt to write them down indifferent because they do not compare well with our own men in smartness and appearance; and when they observe sentries loafing on their posts, slovenly saluting, troops marching without keeping step, and harness old and unpolished, they are led to think that when such things are permitted very strict ideas of duty cannot exist. I may refer particularly to the French close-order drill and the manual of arms. According to our ideas nothing could be worse than either. So long as the men get into their places, so long as the rifles are brought to the shoulder, it does not matter how it is done. To see a French battalion forming fours or presenting arms would make the hair of an English sergeant-major stand on end. But, for all that, although the movements of the individual men have not the slightest pretence to precision or smartness, the movements of the battalions are very rapidly executed, and changes of formation are made with the greatest readiness. Still it is very evident that no more is exacted from the men than that they should be able to march without losing distance or interval, and to find their places in the ranks without confusion or delay. It is when the attack begins that steadiness, regularity, and strict discipline are first apparent; and when they are actually engaged on the field the French soldiers are best in hand. Directly deployment takes place everything tightens up. The slackness and shuffling observable at other times disappear at once, giving place to silence, alertness, and precision. In fact all other branches of military training, except marching, are made subordinate to duties under fire; and

it appears to be considered in France that inattention to details on the parade-ground is not incompatible with the strictest discipline in the field. Nor is precision in close-order drill and in the manual of arms understood as the necessary foundation for precision of movement, good order, and subordination, in battle formations.

The same observations will apply also to the somewhat easy relations between Officers and men. In the first place, France is a republic; secondly, numbers of the men in the ranks are socially equal to the Officers; thirdly, the ordinary usages of military etiquette are never strictly enforced; when speaking to an Officer the men do not always stand to attention, and the Officers seem perfectly indifferent to their attitude. At the same time I observed no want of respect and no undue familiarity; and although it appears strange to us to hear an Officer say to a corporal, "Will you please fire a volley in that direction," yet when irregularities occurred there was no lack of decisive language. I may observe, as a point of interest, that I have been told by Officers who took part in the Crimean campaign that the characteristics peculiar to the French troops of to-day astonished the English Army when the Allies first met in 1854.

Outposts during the manœuvres were not, I believe, invariably established, and, when they were, no night enterprises were allowed between the hours of 9 and 4. I do not know whether the piquets were usually withdrawn to cantonments at 9 o'clock; on two occasions I saw them making preparations to spend the night in bivouac. The duty of observation was carried out in much the same fashion as our own—double sentries and small recruiting patrols of a non-commissioned officer and a couple of men. The piquets often made shelters for themselves of straw, very quickly put together. On the march and during the engagements I did not notice much use made of either flanking or fighting patrols. Whether the former are of very much use in an open country in these days of long-ranging rifles is a doubtful question. To be of any value they must move at 800 or 1,000 yards on the flank of the line of march, a thing in itself almost impracticable, and a few mounted infantry would be far more effective. The fighting patrols, that is, scouts thrown out to secure the flanks of the battalions, especially when on the defensive or moving over broken ground, were, on more than one occasion, conspicuous by their absence; on others, it was not until the battalion had been some time established in position, although the flanks were exposed and the ground beyond hidden, that anyone thought of taking this precaution against surprise.

I have alluded to the unrealities which obtruded themselves in the field, especially during the infantry attacks. Many of these were due, it seemed to me, to the inexperience or insufficiency of the Umpire Staff. Seventy Officers were employed on this duty, and this number was perhaps too few; however this may be, the umpiring was unsatisfactory, very long delays taking place before a decision was arrived at, even in localities where the troops engaged were in no great strength. There is a very marked difference in this respect between

the French and Germans, much in favour of the latter; and it is certain that only by the rapid intervention of Umpires on the spot can the stages of an attack at peace manœuvres be made to represent the rolling backwards and forwards of the fight, the partial success here, the retreat there, the heavy reinforcement at one point, the heavy losses at another, which are the invariable features of the breech-loader battle.

The infantry entrenching tools were seldom used; never on the attack; but points on which to rally, and battery emplacements, were constructed by the engineers. Villages were invariably put in a state of defence, walls improved, shelter trenches thrown up, and the roads barricaded; but this work was left to the sappers. I may notice here that the front occupied by the armies when in line of battle was very long, averaging, when Generals Davout and de Galliffet were engaged against each other, from 7 to 8 miles for 50,000 men. The corps d'armée were kept well concentrated, but there were often gaps between them, partially occupied, it is true, by artillery, but still gaps for all that.

No description of the French troops would be satisfactory without some reference to discipline, for, as you are aware, history charges their predecessors of 1870 with much laxity in this respect. Manœuvres are not a very severe test of discipline, but I do not think that a soldier, mixing freely with the troops on the march, on the field, on the outposts, and in quarters, can fail to get some idea of the relations that exist between Officers and men, and also of the way in which duty is performed. Speaking for myself, I saw no symptoms either of insubordination, or disrespect, or carelessness in the execution of orders. The French regimental Officers look well after their men, especially in cantonments; they treat them in a very fatherly manner; much good feeling appears to exist between all ranks, and while discipline is strict and irregularities checked without hesitation, the Officers and non-commissioned officers, so far as I could see, always attend to the comfort of their men before considering their own. It is true that many of the non-commissioned officers, who are very young, appear shy of asserting their authority and want the habit of giving decided orders, but I never detected the least tendency to insubordination or slackness on the part of the rank and file. Under the most trying circumstances they were full of good humour, and the Officers set them an excellent example. The accommodation in the little towns and villages, which had generally the troops quartered on them in the proportion of two or even more soldiers to each head of the population, was by no means luxurious, and even the Headquarter Staff had to put up with very rough fare. But there was no grumbling to be heard; and the Officers, as a body, took very kindly to their mimic campaigning, and showed much interest in the operations. Maps (R.F., 1/80,000) and field-glasses were carried, and used, by every regimental Officer.

There are many other points which I should have liked to discuss, but time will not permit me to do more than refer to them. The use of a balloon by a Commanding General was a novel feature. At

the engagement at Colombey, General de Galliffet took up his position in the car, sending down his orders to *terra firma* by telephone. The balloon kept well outside extreme artillery range, and, the country being so open, must have afforded a wide view. It had this disadvantage, that it disclosed the position of the Commander, and the probable centre of his line. At Vendeuvre, the balloon changed sides, and joined the attack. Telegraphs and telephones were extensively used during the manœuvres; as were lamp signals, both by day and night. The commissariat department caused no complaint. The rations were plentiful and of good quality, but I heard there was some grumbling as to the want of water on one or two occasions. The empty wagons were sent back to the base of supplies by night, and the roads were thus left free for the marching columns by day. A great part of the supplies were procured by requisitions, sent in some time previous to the manœuvre period, but field bakeries were employed, and both they and small herds of oxen accompanied the troops. I do not think that any severe strain was put on the supply department, and the manœuvres afford very little insight into the capacity of the Intendance for providing for the wants of the vast armies France could put into the field in case of war, perhaps the most difficult of all military operations.

In conclusion, I may say that my impressions of the French Army may appear altogether too favourable, and you may think that I have looked at everything through rose-tinted glasses. I was glad to see, however, that an English artillery Officer, whom I had not the pleasure of meeting at the manœuvres, appears, judging from a very interesting paper in the Royal Artillery Institution Journal, to agree with all the conclusions at which we infantry Officers arrived. But there are people who, looking back at the mismanagement and errors of the great war, will not believe that a French army can be anything but rotten at the core. I will only remind such critics that Von Moltke's campaigns are now almost a matter of ancient history; that the French Army has been thoroughly reorganized; and, also, I would bid them remember that the French regular troops, despite the mediocrity of their leaders, their want of practical training, their faulty organization, and their long series of defeats, fought from first to last with splendid courage. How near they were to being victorious in more than one of the great battles in August, 1870, even German writers have not hesitated to own. The "Contemporary" article I have already alluded to is a case in point. "The more closely," writes Colonel Hale, "the episodes of the battle are studied, the greater the admiration with which the French private soldiers and regimental Officer must be regarded as combatants. The pure-bred Frenchman, as well as the Turco and Zouave, fought splendidly. The large number of Officers on the active list amongst the regimental leaders would in no way account for the stubbornness with which, when fighting a losing battle, they yielded the ground inch by inch; although it may have contributed to keep them together when, like lions at bay, they suddenly exchanged the rôle of defence for that of offence, and, springing on the foe, drove him back in headlong flight to seek

safety in the woods and vineyards. The percentage of losses is one of the best criterions of fighting stamina. In the French regiments, actively engaged, this percentage ranges from 29 up to 93·1, which latter practically means annihilation. On the German side the highest regimental percentage is only 37·62. Well," he adds, "might a German Officer of the very highest rank say, as he afterwards did, 'We were within an ace of losing the battle; but the French did not know it, and I hope they never may.'"

At the same time, I do not wish you to go away with the idea that I believe the French Army to be a perfect military machine. There is much pertaining to the efficiency of the army for war towards which the manœuvres do nothing to enlighten us. Do the Generals pull well together? Do they possess initiative? Can the artillery shoot? Are the infantry good marksmen? Here the manœuvres are no guide whatever. Nor were they altogether free from tactical blunders; but I very much doubt if any manœuvres, in any country whatever, passed off without giving many opportunities for criticism. Neither did the Officers always display capacity for command and thorough knowledge of their duty. But amongst a mass of men it is impossible that all should have reached the same level; there must be some distinguished by superior energy and decision, others who were never born to lead men in action.

To dilate on the shortcomings I observed would scarcely be profitable—"we are none of us infallible, even the youngest of us"—and in manœuvres as in war mistakes and blunders are inevitable. Nor, after the pleasant time spent in Champagne, would such a task be a congenial one; and I prefer to take this public opportunity of acknowledging, in the name also of my brother Officers, the courtesy and kindness which made everything so smooth for us.

One thing may certainly be said of the French Staff, and this is that they have proved themselves fully equal to the task of concentrating, feeding, and moving 100,000 men in a confined space, and also in dispersing them without delay to their respective garrisons.

It must be put down to their credit that the manœuvres, extensive as they were, passed off without a single hitch.

The CHAIRMAN: Major Henderson's lecture differs from other lectures delivered in this Institution, because, whereas some of them are almost bristling with points which give rise to discussion and argument, in the hope of changing the opinions of the lecturer, this of Major Henderson's, which I call a very admirable lecture, recites only his own experience of what he saw of the French manœuvres last year, and the opinions he arrived at. I do not suppose any of us think that we are going to change those opinions by what any of us may have seen; nevertheless there are gentlemen in the room who know a good deal about Foreign armies, and have attended the manœuvres of different countries, and I hope the lecture just delivered will inspire members with a desire to add to the amount of our knowledge on this subject, so as to carry out the principles which we all have most truly at heart, viz., how to prepare our own countrymen for successful warfare.

General Sir ARCHIBALD ALISON: I think I may say this has been one of the best lectures I ever heard, and one singularly suggestive. There are many things in it which make one think. I was particularly struck with the account of the mode in which the French prepared for the attack. It is such a

singular contrast to that which was carried out in the last campaign by the German Army. It showed a most careful arrangement of everything before the actual attack was delivered; not the hurry, into often disunited action, that was so frequently the case in the campaign of 1870, in order to support an attack made, without orders, by an advance guard with a small body of men. It seems to me that this is a matter of the greatest importance, and which ought to be most carefully gone into. I cannot help thinking that in this particular the French are entirely upon the right track, and the one which will be found in the end to be by far the most effective, and leading to the least loss in modern battle.

Colonel FRASER: I should like to ask one question. Can the lecturer give us any idea of the difference in height between the two tiers of guns? Can he tell us, roughly speaking, what was the minimum difference in altitude between the guns and the distance from the front to the rear line? One row of guns was down a slope, of course, and one behind it.

Major HENDERSON: One was on the ridge, and the other in the valley.

Colonel FRASER: A considerable distance below.

Major HENDERSON: I remember one occasion when it was very distinctly marked—at the battle of Colombey, where the top tier was at least 150 feet above the lower tier, if I remember, and the lower tier was at least 600 or 800 yards to the front. When they were in two tiers, I never saw them very close together. I should think they were always well over a quarter of a mile apart.

Colonel FRASER: What was the difference between the heights?

Major HENDERSON: 150 feet on one occasion that I remember.

Colonel FRASER: Can you say whether you are perfectly certain that the French batteries carried the whole weight of service ammunition?

Major HENDERSON: I did not inquire into that.

Colonel FRASER: That is a very important point, indeed, *i.e.*, whether there were 39 cwt. behind the horses. Did they move, for practical purposes, quickly enough for the infantry movement? I am not speaking of the Horse Artillery.

Major HENDERSON: Oh, yes, certainly.

Colonel FRASER: What distance was the balloon from the field batteries at the time they were supposed to be firing at it, when General de Galliffet was in it?

Major HENDERSON: We measured with a range-finder, and I think we calculated about 5,500 metres. We were behind the guns, but we took the distance with one of the little watch range-finders.

Admiral SIR ERASMUS OMMANNEY: May I be allowed to ask one question? This is the first time manœuvres have been carried out with the use of smokeless powder, and I would like to ask what was your opinion as to its general effect, whether it facilitated operations, or enabled them to carry a larger quantity of ammunition? What was the advantage which was obtained by the use of smokeless powder throughout the operations?

General GOODENOUGH: There is one thing for which we must certainly welcome the lecture. Major Henderson rather distinctly, instead of leading us on, as we have sometimes been led on, to admire everything that we see, and to lament the difficulty of getting it ourselves, has pointed to the difference between movements as practised in our own country with our own Army and those carried on in France. As to the outcome of the manœuvres in France, it seems to me that the attention of their Staff must have been directed in the highest degree to contending with the enormous difficulty of moving such huge masses of men, and that the points the lecturer has called attention to, of discipline and so forth, would be points that the French Staff made a great deal of, because they felt that everything should be subordinated to getting their large masses of men into position with order and regularity. How far we should go entirely for that, having regard to the smaller number of men with which we shall have to operate, and how far we should be led to disregard what we usually do regard, seeking cover, and adopting our movements to the exigencies of the occasion, is a question which I think the lecturer has done well in leaving to our discretion. There are one or two questions that I wanted to ask the lecturer, first, whether signalling was much practised in these manœuvres. Perhaps he can tell us whether he saw that use made of signalling in the field which we so often see attempted in this country. He has not mentioned it in his lecture. He also refers to

a map, but if he would kindly state what the scale of the map was which was in use by the Officers in the field it would be of some advantage, and also what was the material on which the maps were printed, whether thick or thin paper, linen, or any other substance. The water-supply we have been told was a difficulty; that is to say, the country was very ill supplied. I should like to know a little more in detail as to how the supply was obtained, both in camp and on the march. Also perhaps the lecturer will tell us, with regard to the Umpires referred to, was the system followed, which is usual in this country, of having Umpires attached to each side, or was there any attempt to place Umpires between the combatants, or as it were between the armies, or between the two wings of each force, to give directions and decisions, impartially to one side or the other, as between the opposing forces in any section of the field, rather than to have Umpires attached to each army, the attacking and defending, who have to compare notes afterwards and come to a decision? I should like to know which system there is a tendency to follow in France.

The CHAIRMAN: Ladies and gentlemen, as no other Officer wishes to make any remarks, I will not detain you very long. I have been very much interested in what Major Henderson has said about these manœuvres, and his criticisms seem to be very much what a great many of us have gathered from reports in the press and elsewhere. There are certain minor points, such as the movements of patrols on the flanks of columns, with which as details we need not concern ourselves. They must vary with the country, the nation, the enemy, the weather, and with many other considerations. Similarly, as to the system of cavalry exploration, whether it is advisable to distinguish the cavalry used for reconnaissance from that used for offensive or defensive purposes is a difficult point to decide. I was much struck with what Major Henderson said about the arrangement in which everything was put forward, and I noticed myself the same thing when I was attending the Austrian Manœuvres in 1886. There also the arrangement was first-rate. So far as we foreign Officers were concerned, we came in daily from the manœuvres in the course of the afternoon; and on the following morning at 6 o'clock we had a lithographed paper put upon the table, showing exactly what the Umpires had ordered as the result of the previous day's action, together with a map of the country in which the manœuvres were to be carried on, showing all the roads. Everything was to scale, so that when we were ready to ride out and see the fight we knew exactly where to go to. Similarly at the commencement of the day's manœuvres there was no shouting, no bugle sound. The General Officer gave his orders quietly. Those orders were conveyed through the Brigadier to the Commanding Officer, and the whole body of troops moved off in silence. There was hardly a sound heard till the firing commenced; all was done by direct personal communication, from the General down to the leader of each little squad, and each commander was absolutely free to act as he thought well. I think, if the discipline of troops will admit of it, that silence is of very great advantage on active service. There is only one other point, and that is as to the Umpires. I quite agree with Major Henderson. I believe that the largest amount of advantage from manœuvres for the Army will result from a thorough system of umpiring. Tactical faults at a field day should be corrected on the spot and at the time. Then all ranks benefit by the correction and learn. Frequent decisions by Umpires given during pauses in each day's operations are the most beneficial for troops, and, above all get the ablest and best informed Officers to act as Umpires. The result of all modern fighting must be disorder: and the problem for troops is to reorganize that disorder for fresh efforts; and in my opinion a carefully planned attack, such as Major Henderson speaks of, is not the best plan for instructing troops. I do not gather from this lecture that Major Henderson saw such a system of reorganization of disorder at these manœuvres, though no doubt he did see the extraordinary arrangements by which the French people have been able to feed and manœuvre 100,000 men in divisions, corps, and as one army acting on the defensive for such a force in a comparatively confined area, and that there was no hitch throughout. But, on the other hand, there was no enemy to create the hitch.

Major HENDERSON: The first question put to me was by Sir Erasmus Ommanney, asking whether, in my opinion, the smokeless powder most favoured the

attack or the defence. I think it is difficult to sum up the whole question in a single sentence. Smokeless powder certainly favours the attack in one most important point; and this is that the artillery are able to fire over the heads of their own infantry, until the latter get well within decisive range. As soon as the assailant has silenced the defending batteries, the two armies would be able to combine, in a much more effective manner than has hitherto been the case, against the defending infantry. With regard to the defence, there is much advantage gained by the visibility of the attacking lines. Their numbers may be easily estimated. It was different in the days of the old powder. Now, with smokeless powder you can see the first line and its fractions; the second line in rear; the third line behind again; and the reserves far away in the distance. In open country you can calculate accurately the number of troops you have to deal with. Then as to a demonstrative attack. We all noticed how soon it became apparent that it was only a feint; even the soldiers in the ranks used to laugh and say, "That fellow does not mean it; he is not coming on: the real attack will be from over there." It is easy, when there is no smoke, to see whether troops really intend coming on. The whole operation moved slowly; there was no energy about it; and you could see there were not so many lines in rear. In one way or another the demonstrative attack could always be detected, and this is rather an important point in modern tactics. General Goodenough asked about signalling. Signalling was very little used. The French have flag signallers, but I do not think I ever saw the flags taken out. They have a system of signalling with lamps and mirrors which can be used equally well by day and by night. I saw them used both by day and night, though not often. The stations I noticed were about a couple of miles or so apart; but they say in France that the stations can be much farther apart and that they can read the lamp signals quite easily at even 30 kilometres. They give a very bright light even on a bright summer's day, but they are rather clumsy to carry. As to the maps which were used by the Regimental Officers, I do not know on what material they were printed. I should rather fancy thin map card-board. They were on the scale of $\frac{1}{80000}$. The supply of water I cannot say anything about. I never saw water following the troops on the march, but they always had their canteen wagons; and their water bottles are filled not with water, but with wine.

General GOODENOUGH: The canteen carriages are not to be confounded with the water carriages?

Major HENDERSON: No, they are regular canteen carriages—cantinières. As to the Umpires, I can give very little information. There is an Officer here who probably knows more about the Umpires and their system than I do. I can give General Goodenough a copy of the Umpire Regulations. I think they were not at all satisfied with the Umpires at the manœuvres, and they think of changing the system.

General GOODENOUGH: My object was to get something which might be useful on the Proceedings.

Captain À COURT: I believe they had about 70 Officers, and they put every senior General Officer in charge, and each of these Umpires had certain sections of ground and a certain number of units to look after on both sides. Of course it is very hard work to follow exactly how they worked on each side; but, as I heard on several occasions, the Officers were not at all satisfied with the system.

General GOODENOUGH: You say that the instructions are embodied in Regulations?

Captain À COURT: Yes, there are Regulations.

The CHAIRMAN: I think, with your permission, I may give the thanks of the meeting to Major Henderson for his most excellent lecture.

Wednesday, July 6, 1892.

The RIGHT HON. LORD BRASSEY, K.C.B., in the Chair.

THE DIMENSIONS OF MODERN WAR SHIPS.

By Captain S. M. EARDLEY-WILMOT, R.N.

The CHAIRMAN : It is hardly necessary to go through the formality of introducing Captain Eardley-Wilmot to an audience who know him well, and who, I am sure, recognize his professional ability, and not only his professional ability but his ability in the use of his pen on important professional topics. The subject which he brings before us this afternoon is one of great importance, being nothing less than the ship-building policy of the Navy, especially of those types which are designed for the line-of-battle. The paper will, I am sure, be found of great interest.

OVER thirty years have elapsed since the present reconstruction of our Fleet commenced. Iron then succeeded wood as the material of which the hulls of battle-ships were built, supporting masses of iron plates, considered essential for protection against that shell fire which certain operations of war had demonstrated to be so effective against wooden ships. The old smooth-bore gun, which had for centuries been the arbiter of naval battles, was replaced by rifled ordnance, gradually developing into the 110-ton gun of to-day. Two new weapons have come into play—the ram and torpedo. Steam, as a mode of propulsion, giving the movements of ships a freedom they had not before possessed, and assisted by the great weight of a modern ironclad in rendering serious a blow delivered at, or below, the water-line from such a source, has naturally induced many to place the ram in the front rank. Its power has been proved on more than one occasion. In the only action between squadrons of armoured vessels—that off Lissa—one of the two ships put out of action on this occasion succumbed to the ram. The unintentional application of this force sent the “Vanguard” and “Grosser Kurfurst” to the bottom. On the other hand, examples are numerous to show that, with two vessels manœuvring at equal, or nearly equal, speeds, this attack requires not only great skill, but an accurate knowledge of the path of a ship under varying conditions of speed and helm angle.

The torpedo, no less effectual when successfully applied, must score more victories before it is generally accepted as equally important. Recent experience, however, has shown it cannot be

ignored. The sinking of the "Blanco Encalada," an ironclad of 4,000 tons, by a craft one-fifth of her size, was an exhibition of the deadly nature of submarine attack full of significance. Neither gun nor ram, carried on such a displacement, could, it appears to me, have effected the same result.

But the main point I wish to bring forward in this paper for discussion is, whether we cannot now, after an experience of thirty years, formulate some definite rules on which the construction of a fleet should be based; the types of ships it should include, and their dimensions. It may be said this is impossible. Ships building to-day will be obsolete ten years hence; guns considered effective now will be shortly superseded by totally different weapons. This style of argument is much in favour; but I hold it is quite fallacious. We have ironclads now over twenty years old, which are still capable of most excellent service; and, indeed, our most modern types rather indicate a return to that so-called obsolete system of construction.

It should be remembered that now, more than ever, it is essential that, at the outbreak of war, we should possess a large number of ships. As Nelson wrote: "It is not merely a splendid victory of twenty-three ships over thirty-six which the country requires; that which we need is, that the combined fleet should be annihilated, and it is only *numbers* which can annihilate." But if it was important then, how much more so now, when it is considered marvellous work completing a first-class ironclad in three years. In the old days a line-of-battle ship could be built and equipped within six months.

We cannot now, therefore, count on supplementing our naval force to any considerable extent during hostilities, from our own resources, unless wars are of great duration. Nor should I be disposed to anticipate that much assistance would be derived from captured vessels, as in the past. Ironclads carrying thousands of tons of iron have not much reserve of buoyancy, and the under-water attack is directed towards sinking rather than capture. Hence our efforts should be concentrated on ensuring an overwhelming superiority, that losses could be at once replaced and fresh fleets formed to face the enemy. Under present conditions that nation will have an enormous advantage which, after a severe sea fight in which the losses may be great on both sides, can at once array in battle a second and third squadron, whether composed of the latest types or less recent ships.

Now, before entering upon the question of types and dimensions of modern ships, it will be interesting to observe how experience in the old wars led to the clearly defined grouping we see in the naval construction of that day. To those who wish to follow the various stages by which we passed from the strangely assorted fleet successfully paralysing the efforts of the Spanish Armada without any very clearly defined plan of action, to the formation of a line of battle composed only of ships of a certain rating, I cannot do better than refer them to the chapter on "The Differentiation of Naval Force" in Admiral Colomb's excellent work on Naval Warfare. Here I only propose to dwell upon the outcome of long experience and many wars in producing a class of ship in great numbers which was not the most

powerful of that day, but could, and often did, successfully cope with the best the enemy brought against us. At that period, the guns not varying much in size, the measure of a vessel's strength was the number of ordnance carried, and this could only be increased by additional tiers, which determined whether she was to be a two- or three-decked vessel. There were such things as four-deckers, but the species was rare, and I do not think we ever produced any of this class. There was a model of one proposed—the "Duke of Kent"—in the Naval Exhibition, but she was not built. We may consider the three-decker the largest battle-ship of that day, carrying from 100 to 120 guns. Forfait, the celebrated engineer, once said: "It is really the cannon which alone gives the law at sea." Those wooden ships never attempted to ram each other. They feared to lose their masts, and only as a last resort and preliminary to boarding were hulls intentionally brought into contact. As also the under-water attack was then unknown, the natural inference might be that for the line of battle only ships of the largest class would be built carrying the greatest number of guns. As a matter of fact, however, this was not the case. Two-deckers of various classes were constructed in the greatest numbers. When it was found that the smallest class could not cope in the line with the heavier craft to which they might find themselves opposed, their construction was abandoned, and the favourite type became the 74-gun ship. It was found that this class stood the blockading work better than the three-deckers. They drew less water, and usually had superior sailing qualities, while they could hold their own against the largest vessels of our enemies. They were not all of exactly similar dimensions in hull or spars. Indeed it is recorded that when off Cadiz Nelson had no less than seven different classes of 74-gun ships under him, each with a different establishment of stores and spars, so that if any one was disabled the others could not readily supply her wants. The 74-gun ship, then, was the type which the true test of war had demonstrated in those days to be required in greatest numbers. During the long peace which followed after 1815 they were gradually superseded by larger vessels, until in the Baltic, forty years later, their want was again felt. Sir Charles Napier wrote: "We seem to have quite forgotten that there are such seas as the North Sea and Baltic, where small ships of two and three decks are indispensable. There are also many places where the like qualification is necessary, and I well recollect during the siege of Cadiz we were obliged to look up all our old 64's with a light draught of water, so that they might lie clear of the enemy's shells. Another thing we seem to have forgotten, that all the work of the war was done by the 74's, and that the large ships did not stand the blockade as well as the small ones."

Though we did not towards the close of the long war discontinue entirely the construction of three-deckers, the number built was few, and they were kept chiefly as flag-ships on account of the increased accommodation they afforded. Under similar reasoning we should, I think, at the present time have a small number of ironclads of larger

bulk than the majority. Passing over that brief period of steam wooden ships which did not last long enough to undergo any crucial test, we come to the reconstruction of the Fleet with ironclad battle-ships. As representing the three-decker, we built the "Warrior," of 8,820 tons. The increased weight was due to armour, machinery, and coal. In view of the effect of shell fire, as demonstrated at Sinope and Sebastopol, it was considered essential that a large portion of the hull should be covered with iron plates $4\frac{1}{2}$ inches thick, which involved, with the backing, a weight of 1,350 tons. The result was a noble vessel in which the protection was not given undue prominence. Approximately one-sixth of the total weight was devoted to what may be called the passive defence. As we now allot nearly one-third of the displacement to armour protection in one form or another, the change in this respect can be understood.

When producing such vessels as the "Warrior" and "Black Prince," we did not neglect at the same time to build smaller ironclads as representing the two-decker, and as well qualified to take their place in the line of battle. The "Defence" and "Resistance," of 6,000 tons, were considered powerful fighting ships; and when heavier guns and thicker armour resulted in our first-class battle-ships attaining a displacement of 10,000 tons we continued to construct ironclads of about 6,000 tons, of which the "Audacious" class is a worthy example, one of their advantages was that they could traverse the Suez Canal, and hence for many years one of these vessels carried the flag in the China Seas.

This feature of moderate displacement was further displayed in such vessels as the "Rupert," of 4,400 tons, also the "Conqueror" and "Hero," of 6,200 tons. But for some years we have discontinued building any battle-ship of less than 9,500 tons, and our latest so-called second-class ironclads, the "Centurion" and "Barfleur," are to be of 10,500 tons displacement. These will, I believe, prove most admirable vessels; and the point in my mind is whether we should not add largely to this class, and limit our supply of the bigger type—at any rate for the present—to those we already possess. Let us see what we can combine in a vessel of 10,500 tons as exemplified by the "Centurion." First there are four 10-inch 29-ton guns; a pair of them being contained in a barbette at each end. Though the movement of the turntable on which these guns are mounted is actuated by steam power, the operation of loading and making ready to fire is performed by hand. This by many is considered an important point. Armour to successfully resist perforation by these weapons must be limited to a small area of the hull, and consequently the target it affords may be neglected in favour of the attack of those parts protected only by thin armour, or without it. Associated with these powerful guns is an auxiliary armament of ten 4·7-inch quick-firing, or more properly speaking, quick-loading guns. The power of recharging a gun rapidly is equivalent to a greater number; but this very quality will tend to hasty aim, which must need constant supervision and firm control. As regards protection we are able to have a belt of steel, or com-

pound armour, 12 inches thick for 200 feet of the water line, out of a length of 360 feet. This is sufficient to resist penetration of all common shell, and almost any other projectile that can be brought against it under the varying conditions of a sea fight.

When in the early stages of ironclads the growing power of the gun had demonstrated that hardened projectiles could be sent through 8 or 9 inches of wrought iron, we should at once have sought to increase the hardness of the plate, instead of adding soft material, until we had attained to the monstrous thickness of 24 inches. It was only under the stress of foreign competition, and after seeing what the French steel plates were capable of, that our manufacturers turned their attention to a new material and produced compound armour. This has been still further improved lately, and can successfully resist the best steel projectiles. I think, therefore, we may limit the thickness in all cases to 12 inches. In addition to this vertical and external armour, the "Centurion" has the now usual armoured deck, and more protection to the auxiliary battery than has hitherto been given in the "Admiral" class of equal displacement.

As regards speed, though it is the most valuable quality in a cruiser, I do not think we should sacrifice too much for it in battle-ships. They will ordinarily be in company, maintaining a speed of about 10 knots. Circumstances may require this to be increased, and when on detached service it would be important to have the ability to keep up a speed of 15 knots for a considerable period. This should be well within the powers of the "Centurion" and "Barfleur," which are to have a natural-draught full speed of 17 knots. As the coal stowage for these vessels is sufficient for 1,000 tons, good provision is made for this important item.

The weight involved by a torpedo equipment is relatively small, so that this weapon can be fully developed in a ship of moderate dimensions. We find, therefore, that in a vessel of 10,500 tons we can combine a powerful armament, sufficient protection to the structure, and an adequate speed. When increased dimensions are given, the additional tonnage is chiefly taken up in providing more armour. Here it may be interesting to observe by the following table the progressive increase of displacement and amount of armour carried in the three decades since ironclads superseded wooden ships:—

Year.	Ship.	Total displacement.	Total weight of armour and backing carried.	Maximum thickness of armour.
		Tons.	Tons.	Inches.
1862	"Warrior"	8,820	1,350	4½
1872	"Devastation"	9,350	2,900	12
1882	"Inflexible"	11,500	3,500	24
1892	"Royal Sovereign" ...	14,200	4,500	18

By this we see that not only has the proportion between total dis-

placement and armour carried materially altered, but that the latter in our most recent construction is practically half the entire weight of our first ironclad, and equal to the displacement of a large cruiser. It must be remembered that this armour is all devoted to sustaining the ship against gun fire: that it makes her no more capable of withstanding the blow of a powerful torpedo or ram than if she were unarmoured, and that it necessarily curtails other qualities which, if vigorously applied, will probably prove the best defence.

Let us now consider the relative advantages and disadvantages of large ironclads. First, there can be no question that by adding to the displacement an individually more powerful ship can be produced. But if this argument is considered sufficient to outweigh all others, on what grounds should we stop at 14,000 tons? A vessel displacing 20,000 tons can be built in which every quality I have alluded to can be proportionately improved. It is only a matter of time, money, and material. This reasoning also applies to the argument that concentrated force in a single vessel is more effective than when distributed over a greater number of less power. In the discussion on the designs of our new battle-ships at the Institution of Naval Architects, Sir Geoffrey Hornby endorsed this view, but added, "I think it better we should have ships of medium size." He alluded to the disadvantage of very big ships in the matter of harbour and wharf accommodation. There is also the question of draught of water and existing docks rendered useless for large ironclads. These may seem comparatively unimportant details, but Commanders-in-Chief have in peace-time to give much attention to these points, and in war-time they might preclude the use of what would otherwise form a very convenient base of operations. Though some are of opinion that the Suez Canal cannot be relied on during actual or contemplated hostilities for the concentration and passage of war ships, it is at present debarred to the greater number of our modern ironclads owing to their deep draught.

The strategic advantage of two ships over one in covering a larger area of sea or coast can hardly be disputed. The power of detaching small squadrons from the main body for any service, without materially weakening the latter, is greater when the ships are individually less powerful but more numerous.

We cannot overlook such points as time and cost of construction. If we have brought the period of completion of such a ship as the "Royal Sovereign" within three years, we may safely assume that the "Centurion," and others like her, can be built and sent to sea in two. The gain of one year is important, and we may yet find methods of reducing the time.

As regards cost, the first-class battle-ship of to-day represents an approximate expenditure of a million sterling, as against about 400,000*l.* for the "Warrior," which in turn was about double the cost of the old three-decker. It is a serious matter for reflection, when we find eight vessels costing as much as twenty of our early ironclads, and nearly equal in value to all the ships engaged on both sides at Trafalgar.

We now come to the influence which the ram and torpedo have on the dimensions of ships, and they appear to me to turn the scale in favour of moderate tonnage and greater numbers. While we have continued to pile on armour to resist the above-water attack, that portion below the water line is still vulnerable, and cannot be made impervious to the effect of an explosion in contact, or the impact of another vessel at even moderate speed. In the case of two squadrons pitted against each other, in which one has a greater number of individually less powerful ships, the extra rams and torpedoes it puts into the line of battle give an accession of strength which may decide the issue at a critical moment. Thus, if we distribute 114,000 tons—which is the aggregate of eight vessels, each of 14,250 tons—among twelve of 9,500 tons—which gives the same total—we have four additional rams and twenty-four, say, torpedo-tubes. Twelve is not an inconvenient number for a squadron, and the power of bringing into play a few fresh ships at any moment of the action is a great advantage. It decided the day at Trafalgar. Though advocating that for the bulk of our line-of-battle fleet we should construct vessels of medium size, I see reason in possessing a few of increased dimensions for flag-ships in the Mediterranean and Channel. Independent of the increased accommodation which may thus be afforded, it is desirable that those in command should be in the most powerful ships. It would be highly inconvenient if the leaders were disabled early in an action, and the transfer of the flag to another vessel at such a time would not, probably, be practicable. Persano changed his ship at Lissa at the moment of going into action, thereby causing considerable confusion, and a gap in the line through which the Austrian Fleet safely passed. If we attach importance to the continuous guidance of the Admiral in command, we may allot more weight to the ship which carries him, and the position he would be in in battle for directing operations. His conning tower should have additional space and protection. Even with such extra provision in a limited number of vessels, I think their displacement should not exceed 12,000 tons, while the far larger proportion should range from 9,000 to 10,500 tons.

I do not attach importance to the argument so frequently put forward, that, because other nations build monster ships, or guns, we must follow suit against our own judgment. We should have the courage to abstain from such a course if we believe it to be unsound in principle. Our forefathers, at any rate, did not follow this course, but based their construction on what the true test of war had shown to be most needed.

Time will not permit me to deal at length with the dimensions of cruisers. In their case we do not find quite the same parallel with the past as with battle-ships. In the old days good sailing qualities were to be found in comparatively small frigates, whereas now speed under steam, and ability to sustain it ensured by a good supply of fuel, must be associated with length of ship and considerable displacement. But we need not attempt to combine with these qualities the armour and armament of a battle-ship. Frigates never attempted to cope

singly with a two-decker, but took to their heels on meeting one, and a modern cruiser should do the same. Numerous light guns should form their armament, and if anything heavier is permissible, it should be a stern, not a bow, chaser. A more powerful antagonist coming up astern might thus be disabled before arriving at close quarters. One can understand the estimation in which the old 32-pounder was held. The gun weighed less than 3 tons; by the appliances then in use it could be manipulated with rapidity; and its projectile was easily handled. The nearest approach we have to it now is the 45-pounder, but the gun and carriage from which it is fired weighs 4 tons, while the 6-inch B.L. gun alone weighs 5 tons. Moreover, the latter is capable of penetrating several inches of armour, an unnecessary attribute in the attack of cruisers. I think it is generally admitted that until lately many of our small cruisers were too heavily armed, as detracting from their speed and other qualities in which a cruiser should excel. Chief among these qualities I place an adequate supply of coal, so that there may be no question of a vessel being able to proceed at speed to any locality with no intervening coal depôt. This is the more imperative now that we have practically abandoned auxiliary sail power. Such considerations entail increased displacement, and hence we find at the present moment no cruiser being built of less than 3,400 tons, while a large number are of 4,300 tons, and a few of 7,770 tons. If ever we have a maritime war again approaching in duration that which terminated in 1815, I think we shall find that the cruiser of about 4,000 tons is found the most useful type, and our requirements in this respect will be large as regards numbers. The bigger cruisers will merge into second-class battle-ships specially constructed for distant stations, while important work will be found for smaller vessels between 2,000 and 3,000 tons.

I am not in favour of devoting any considerable weight to armour in cruisers. They will be overcome in battle, I take it, by the disabling of their personnel, and in these days of rapid fire and machine-guns, if any protection can be given, the crew should have a fair share of it. It seems to me we have got into the habit of considering ships in the light of not how hard they can strike, but rather how much hitting they can stand, and though it is perfectly legitimate to guard vital points, the best defence is, after all, vigorous offensive action. It is difficult to lay down any arbitrary law, but in the light of one who might have to take a cruiser into action, I should be quite satisfied if not more than one-twelfth of the displacement was devoted to protection. I am conscious how inadequate this paper is, as regards the importance of the subject, but it was undertaken rather to initiate discussion than with any idea of my being able to cope fully with a subject in which so many important considerations are involved.

Rear-Admiral LONG: My Lord Brassey, ladies, and gentlemen, the subject brought before us by Captain Eardley-Wilmot is one of very great importance. I should not like to be altogether silent, although I cannot hope to throw very much light upon it. There is one statement here which I think we should begin with:—

"Cannot we now, after an experience of thirty years, formulate some definite rule?" In another part of the paper he mentions the "true test of war." I think we should never forget the thirty years that has elapsed has not afforded us a "true test of war." I think it would be dangerous for any people to argue from experience unless they can find some means of applying the differences due to war conditions. I think there is a consensus of opinion about the importance of reserves. There probably never was a time when reserves were more important than they are now. The great difference, it appears to me, between our own times and those of Lord Nelson is that now a small vessel has the power of destroying a big one. That seems to be the cardinal fact. In the days of Trafalgar it was impossible with a small vessel to destroy a big one. Whatever we may make of that, that appears to be the cardinal fact of the situation. I think it is a very weighty fact against putting more money into one ship than you find necessary. But when we consider why ships are built, we must consider that they are built to fight in definite theatres of war and against definite enemies. It seems to me that, as regards limit to size, very much depends on what your possible enemies build. As we go at present, it appears that we are building quite as large ships as any one else, but I could not share Captain Eardley-Wilmot's opinion as to the desirability of the flag-ship of a squadron being a larger ship than any other vessel. Personally, if I were in command of a squadron, I would much rather have my vessel exactly like the other vessels, so that we should be all on the same footing. I think a homogeneous squadron is a most important thing to have. The great use of these very large ships that we are now building is for theatres of war similar to the Atlantic or the entrance to the Channel. There they would have a most undoubted advantage over any smaller vessels. But some theatres of war do not need such large vessels. I think the theatre of war and the vessels ships are intended to act against must govern the decision in most cases as to what it is desirable to build. I see at present the French are building five vessels of nearly 12,000 tons each, and they have nine others of about 11,000 tons—for these facts I am indebted to Lord Brassey's "Annual"—and Russia has four building, three of 11,000 and one of 12,500 tons, besides two very large armoured cruisers. I should like to say one word about the cruisers. Two, the "Rurik" and a sister, are vessels of 10,500 tons, much larger than our "Blake" and "Blenheim." I think we should have something of an equivalent size, because it seems to me the concentration of force which is so advantageous in a war-ship is nowhere more conspicuously so than in the large cruiser which can suddenly appear unexpectedly in some part of the world, and possibly do a great deal of damage if there is no other vessel able to match her on the spot. She would not take long about it; by the time you knew she was there she would probably be somewhere else. So that it seems to me, if our former policy is carried out, that we should pit one of our vessels against one of the enemy's, it is necessary that we should have a vessel adequate to cope with that other one of the enemy's, otherwise we shall be in the awkward predicament of telling off vessels for all of them except one or two which are much bigger than anything we have got. As to the point that Captain Eardley-Wilmot puts forward so strongly about the armour, it certainly does appear that we have gone to the extreme in the amount of armour on our vessels. It is not necessary because a ship has large displacement to devote that to armour; you might have more speed for it, and it seems to be a very nice question whether we might not with advantage have rather more speed in our large ships and a little less armour, perhaps. Opinions no doubt will differ on that point. I think the strategic advantage of two ships over one in covering a larger area of sea or coast is a most important point. I believe a great many naval Officers would concur entirely in that view. I know Admiral Randolph told me he thought that a very important point. Captain Eardley-Wilmot thinks one-twelfth of the displacement devoted to protection in a cruiser is sufficient. I think that is about the amount in the case of such vessels as the "Pearl" and "Flora," that are now being built. I am very much obliged to Captain Eardley-Wilmot for his paper.

Admiral P. H. COLOMB: My Lord, I am afraid that, although the Navy is not a political service, yet that, looking to the small numbers of our audience, some of us are more concerned with the dimensions and character of majorities than with the

dimensions and character of war-ships. I think it was most important that this paper, the first of its character, should have been read in this Institution, and I consider that the lecturer has been wise in giving us simply a tentative paper leading up to discussion and clearly to be followed by other papers following up, the thoughts which will have been set in motion by the paper read here to-day. I have always found it, myself, extremely difficult to get concise and satisfying arguments as to what the dimensions of our ships should be. We can point easily to individual instances of mistakes that have been made; we can point also to some general principles which should arrange and limit the dimensions of our ships; but when we come to tonnage and force we find ourselves rather met by the difficulty of putting principles into practice. I think we are greatly indebted to Lord Brassey, our Chairman, for so continually harping upon this necessity for taking care that we do not exaggerate dimensions. He, like the rest of us, has laid down principles and given warnings, but he, like the rest of us, has generally been unable to go much beyond those general ideas. But it is the function of a paper of this kind to set our minds going so that we arrive—I might say almost unconsciously—at means of definition which did not present themselves before our brains were set in motion by the words of others. I think the lecturer is quite right, and that we are all agreed that the fact—also adverted to by Admiral Long—that small ships can now destroy big ones is a distinct element in the size of your ships, that we cannot afford to have our big ships running the risk of being destroyed by the small ones, because naval warfare is most especially a question of the money-bag. It is most especially the question of whether your money will hold out. It is most especially the question of producing force in the most economical way, and if we have very expensive ships subject to destruction by very cheap ships, it is clear that we are not acting economically in principle. I never was more struck with this question of dimensions than when I was writing the chapter which has been alluded to to-day, “the differentiation of naval forces.” It struck me so very strongly how our forefathers were driven, almost in spite of themselves, into certain lines: how they began very much as we began, with a new Navy of ships of all sorts and dimensions, without apparently much thought of what was to be done with them when they were built; and how gradually they were forced, both as to line-of-battle ships and cruisers, into particular directions, in which they only seemed to get hardened as war went on. They first separated from the line-of-battle the smaller ships, so as to put those ships that were fighting together more on an equality one with the other, although the equality varied a good deal. They secondly began to separate their cruisers into two or three classes. In the case of the line-of-battle ships they distinctly struck off the smaller ships, and they distinctly struck off the larger ships, and as distinctly increased the number of the medium ships. In the case of the cruisers, they broke them up into very distinct classes; they got rid of the very large cruisers with which they had begun, they chose a class somewhat below them as their largest frigate, and then they made a large gap before they came to what might be called their second-class cruisers. Then from that second class they fell to an enormous multitude of very small ships. When we began to build ironclads we had, we may say, the “Minotaur” (10,000 tons), the “Warrior” (9,000 tons), the “Audacious” (6,000 tons), and the “Rupert” (5,400 tons), all practically side by side. I cannot help thinking that we never should have done that sort of thing if we had been then as much in the habit of studying history as we now are. We should have been more likely to have struck out some medium line of ship of about 8,000 tons to have represented the whole of that class of ship, and, taking the money cost of these various classes, we should have found we could have produced a considerably larger fleet of the medium size of ship than we did produce by having considerable extremes in the dimensions. Passing to the cruisers, Admiral Long seemed rather to argue against himself when he pointed out the necessity of having ships to match ships that the enemy build. History shows us that that practice has never done us very much good. That idea built unquestionably the “Blake” and the “Blenheim,” and the reduction in the size of the first-class cruisers that followed the launching of these ships shows distinctly that the building of the “Blake” and “Blenheim” was a backward step. I believe it is quite certain that the more we know of these two ships

the more we see that if we had had three ships of 6,000 tons instead of two ships of 9,000 tons, we should have had more force, practically more for our money. The moment we begin to follow the lead of our possible enemies, and to build certain ships because they build them, we lose hold of the principle which should guide us, and we begin to concentrate our attention on the particular ships which we have in hand, and we lose the idea of her relations to the whole of the naval warfare which may be forthcoming. Therefore, I think shipbuilding to outmatch particular foreign ships is a thing which ought to be discarded finally and fully. Because an enemy builds a particular class of ship, we ought not to attempt to build a ditto. We cannot guarantee that these two ships will ever come in contact. If we hamper ourselves by building ships of that particular class, we are very apt to build a ship which is only useful for certain purposes, and yet never comes into use for the purpose for which she was designed. We must take a general view, and an average view, roughly, of what our ships have to do, and build accordingly. What duties our cruisers have to do are pretty clear. We all know we must have scouts to accompany our fleets; it is clear that these scouts ought to have an enormous coal supply, because they must be able to run to and fro; they must be prepared to waste enormous quantities of coal in looking out in particular directions, all of which may come to nothing, and yet they must have the coal ready at hand after they have so wasted it. For that purpose we must clearly have large ships, but we need not have ships of great force; we must allow that such ships are to run away from superior force in exactly the same manner as frigates in the old days ran away. It seems to me that after we have a sufficient supply of ships which are intended to scout for battle-ships, and for no other duties, we need not follow up with any large cruisers after that. It would be better to multiply great numbers of small cruisers, because of the great work they would have to do—the watching of ports, the guarding of trade routes—all that sort of work which number, more than force, is required for. I have only spoken (because, as far as I can see, we cannot go any further at present) of some of the general principles which should govern the dimensions of our war-ships, but I feel sure of the effect of a paper of this kind, however small the audience may be, and however compressed the discussion may be by the few who take part in it; when it goes into the Journal it goes all over the Service, and all who read are set thinking about this particular question of the dimensions. All sorts of arguments which are not present to our minds now will arise, and ultimately they will react back to Whitehall, and set the brains there, who have to decide the dimensions of the ships, thinking of them from a more general and a wider point of view than ever they have been able to think of them before.

Admiral BOYS: Perhaps I may be allowed to say a few words, although I much prefer in this Institution that the discussion of lectures should be carried on by those who are likely to have the subject under consideration in their own hands, and by much younger men than myself. As I do not think our lecturer would wish any exaggeration to go forth, there is one point he mentions that might be explained. He says that “in the old days a line-of-battle ship could be built and equipped within six months.” Now, Sir, I am not aware there is a foundation for that report. I do not remember that it ever was done, and I scarcely think it possible. As to the size and dimensions of ships I cannot quite agree with my friend Admiral Colomb. The old adage that the weakest must always go to the wall applies as much to ships and fleets as to anything else, and I certainly must adhere to the principle that has existed hitherto that if our possible enemies build ships of a certain type and power we must have some equal to them or, in fact, superior, in all respects. With regard to the large ships, although it is possible they may be destroyed by smaller ones, we must recollect that, besides their superior defensive power in armour and their offensive power in guns, they can sustain a much greater amount of injury than small ones and still continue efficient. For instance, a torpedo that might sink a small vessel might not seriously damage a large one. The large vessel, from her construction and size, might have sufficient extra buoyancy to keep her afloat and in a fighting condition. As an instance was given just now, a frigate in former days would never attempt to attack a line-of-battle ship. It was considered a point of honour if a frigate came unexpectedly

across a line-of-battle ship she would endeavour to escape ; if that was not possible she would haul down her colours. I think a similar practice must continue to the end of the chapter. What we want in this country is some other naval Powers to go to war ; then we might discover what are really the present requirements for naval warfare, which are now, to a great extent, conjecture. I cannot myself believe that two or three small vessels, unless under very favourable circumstances, can cope with a large one. The large one contains more advantage in herself. If you can be assured always that you would have your two or three small vessels to meet the large one, then I grant it there would be some reason for that view of the case ; but, under the present circumstances, if you do multiply your ships you cannot expect them to be always available at the right time ; they must be distributed. With regard to the torpedo, I think Captain Eardley-Wilmot over-rates its value. The only instance we have of a ship being destroyed by a locomotive torpedo was the “ Blanco Encalada,” and that was a case, as far as we can hear, of the greatest neglect, the ship lying at anchor in a roadstead totally undefended. All the experience of the few naval actions of late years has tended to show that ever since the introduction of steam, of ironclads, and of scientific gunnery, the most powerful ship must win. In battle power means large *dimensions*, and England must not be behind in any type of fighting ship.

Admiral Sir ERASMUS OMMANNEY : I merely rise to express the very great pleasure I have had in listening to what I call a most common-sense view of the various questions connected with the size of ships. I have had no experience myself of the Navy of the present day, but I am certainly strongly in favour of the medium ship. I think that is one of the best points in Captain Eardley-Wilmot’s paper, that if we go much further in the size of these ponderous ships there will be very few of the enemy’s ports that they will be able to enter and do damage, in addition to want of handiness in managing them. I merely rose to express my opinion on this one point, that I am strongly in favour of the medium ship. I am sorry I cannot say anything more as to the ships of the present day, for I know very little about them myself. You must remember this, that in former wars which you talk so much about, the French ships were far superior in construction to the English ships, and were better provided with heavier ordnance, and yet in all cases we managed to defeat them.

Captain MAY, R.N. : I am sure we are all in favour of small ships ; in the same way we should all like to live in first-rate style on 500*l.* a year, but the question is, Can we do so ? The lecturer has taken us back to history, and he has shown us how in the old wars the 74 gradually elbowed out the three-decker ; he has also given us the reasons for that :—“ It was found that this class stood the blockading work better than the three-decker. They drew less water, and generally had superior sailing qualities, while they could hold their own against the largest vessels of our enemies.” Now do any of these arguments apply to the big ships and the moderate-sized ships of the present day ? Is the moderate-sized ship likely to stand blockading work, that is, rough work at sea, better than the big ship ? As far as I have seen, wherever there has been rough weather at sea, the big ship has shown her great superiority ;¹ which seems to show that we are not now in the same position which we had reached 100 years ago, that is to say, when the limit of extreme size had been reached that they could go to comfortably. “ They drew less water.” Certainly the moderate-sized ship does draw less water. They “ usually had superior sailing qualities.” Does the moderate-sized ship of the present day go faster than the big ship ? Sitting, as I am here to-day, by the side of Mr. White, who has had most extraordinary success with his big ships recently, I do not need to remind you that under steam it is very much easier to drive a big ship fast than it is a moderate-sized ship. “ They could hold their own against the largest vessels of our enemies.” The lecturer has alluded to the “ Centurion ” as against the “ Royal Sovereign.” Now the “ Centurion ” has, roughly speaking, from 50 to 60 per cent. of the weight of armour and armament that the “ Royal Sovereign ” has. Now is it reasonable to say that a ship with 100 per cent. in

¹ An interesting comparative trial is now taking place between the 14,000-ton “ Royal Sovereign ” and the 10,500-ton ship of the “ Admiral ” class.

guns and armour will not beat a ship with 50 to 60 per cent. ? Surely our designers must be all wrong if that is the case. I do not think the "Centurion" could possibly be considered fit to "lie in the line," as the old sailors used to say when the enemy's line was composed of big ships of the strength of the "Royal Sovereign." Therefore I cannot see, however desirable it may be, that we can at present afford to reduce the size which has been found necessary to meet the requirements of naval Officers, because it is naval Officers that have asked for this, that, and the other, and it has been found that it cannot be done under 14,000 tons. Then as to the question of cost, it is said, again and again, you can have two ships of 7,000 tons for one of 14,000. Surely that is a fallacy. I will not go into the absolute question as to whether a ton of displacement always costs so many sovereigns, but there is another very important point connected with that, and that is the question of the men. The "Centurion" has about 600; the "Royal Sovereign" about 650. I made a rough calculation that a man costs about 3,000*l*. That is to say, the Estimates devoted to the personnel of the Service are about 7 millions; that provides for about 70,000 men, or 100*l*. a year a-piece. Capitalize that and you get 3,000*l*.; therefore the complement of the "Royal Sovereign" costs about 2,000,000*l*., and as the ship herself costs something short of a million, you get for the "Royal Sovereign" a total sum of about 3,000,000*l*. That is the sum that you would have to subdivide between these smaller ships, and you will find that the complements of the smaller ships are so expensive that, instead of getting two 7,000-ton ships for one 14,000, I do not think you will get more than three of the smaller ships for two of the big ones. At any rate, I think it is a thing that should be considered and thoroughly threshed out. Then, as regards cruisers, we had just now a demand for very great coal capacity and speed; we cannot do that without size. Again, the enemy is starting big cruisers; I won't name them, but we know them all, and it is hopeless to catch a cruiser of 7,000, 8,000, or 9,000 tons if those 7,000, 8,000, or 9,000 tons have been well disposed, with a ship of 4,000 or 5,000, and if you do catch her, it may not be a very pleasant operation. So that, as far as we have gone as yet, I do not think we can relax our efforts in building at any rate as many big cruisers as we shall require to catch the big cruisers that already exist abroad.

Mr. W. H. WHITE: I have read this paper carefully, and came here, not intending to take part in the discussion, but rather to listen to what naval men should say respecting the requirements for Her Majesty's ships. Something has been said on that subject by Admiral Colomb: and I understand that Admiral Long has also given his views. Admiral Colomb said that some of the remarks made by Admiral Long were "self-destructive." As I listened to Admiral Colomb's statement of what was necessary—not desirable but necessary—in a modern cruiser, I had the same feeling, viz., that his remarks were self-destructive. If instead of laying down general principles he had attempted, with the help of some naval architect, to formulate his wishes in an outline design, he would have found that the "Blake" and "Blenheim" were too small to fulfil all his conditions of speed, coal, and armament. The "Blake" and "Blenheim" did not reach 9,000 tons displacement without good reason. They were not built according to any hypothetical conditions. The design was not made simply for the sake of beating vessels that existed in other navies. These two cruisers were built to satisfy conditions specified by the Board of Admiralty as regards speed, armament, coal-endurance, and protection. Hence they reached 9,000 tons in displacement, and a certain cost. The burden of this paper, to a great extent, and the remarks that have been made in the discussion, appear to me to proceed upon a mistaken groundwork. The policy of war-ship construction is not a question, I take it, of first fixing the displacement of a ship and then seeing what is the best which can be done on that displacement. One can make endless things out of 10,000 tons displacement. One may produce a very fine cruiser or an indifferent battle-ship; one may split up the total displacement into a number of vessels of small displacement. With great respect I would say that it is the function of the Board of Admiralty to decide at any time what the various types of ships in the Navy shall be capable of doing. The work of myself and my colleagues is of course simply to say what are the sizes and costs of ships fulfilling the requirements laid down by the Board

of Admiralty. A discussion such as this may serve a useful purpose in assisting the Board of Admiralty in the performance of their difficult duties by putting on record the opinions of naval Officers, but it does seem to me a very left-handed proceeding in discussing types of war-ships to begin by naming the displacements and then seeing what qualities can be obtained on the displacement. If an agreement can be reached—either on the basis of history or a survey of modern conditions—as to what should be the speeds of first-class battle-ships, what shall be the coal supplies, what the protection and how it should be disposed, respecting which features one finds little exact expression of opinion in the paper—then a great point will be gained. Captain May has in his remarks pointed to the fact that in the paper there is an entire disregard of the enormous change in conditions introduced in connection with steam propulsion as compared with propulsion by sails. I would support Captain May's views. In the case of sailing vessels the frigates could get away from the line-of-battle ships; and very often the smaller vessels could get away from the frigates. But that is not true of steamers. A torpedo-boat may get away from a battle-ship, if the weather suits and if she is in perfect condition. The torpedo-boat, however, comes to be so fast as she is by accepting many sacrifices that could not possibly be imposed upon a vessel intended to keep the sea in all weathers and to take a place in the line of battle. What is true in those extreme cases is true also in other cases that might be mentioned. One may with propriety accept certain restrictions in vessels of comparatively small cost which could not be accepted in vessels designed for the line of battle. The differentiation in types of sailing war-ships, which Admiral Colomb has so ably discussed, does not in these days of steamers justify the contention that the Navy should now chiefly consist of medium-sized battle-ships. As in the past, so in the future, it seems that whatever types of ships may be needed to fulfil the multifarious duties that come upon the Navy they should be provided. And I would say further that in this country the bill will be met without a murmur if it can be shown that the necessity exists. With all respect to naval Officers, I may add that in discussing these matters and asking for information, I have the greatest difficulty in finding agreement upon points affecting war-ship design. No doubt that is an inherent difficulty of the case. If we go back to the year 1888, when the Board of Admiralty had to frame its new programme, members of this Institution will agree that no more business-like procedure could have been followed than was then adopted. Designs were not settled and simply put down to be formally "approved" by the distinguished Naval Officers summoned to confer with the Board of Admiralty. On the contrary, the conditions were stated broadly; alternative designs were put before the Officers summoned; and, in the end, there was practical unanimity in recommending the acceptance of certain conditions of offence and defence. To fulfil these conditions a very large line-of-battle ship had to be constructed, and the "Royal Sovereign" was the result. In comparing the "Centurion" and "Royal Sovereign" I want to avoid technicalities: and, as the designer of both ships, I may say that it is most interesting to compare them by their displacements only. The "Centurion" is a vessel of 10,500 tons, wood sheathed and coppered; that is to say her displacement is increased very largely, simply by the condition that she should be suited for distant service and be able to keep out of dock for long periods with no serious loss in speed. In the paper no mention is made of the influence of this sheathing upon size and cost, but it is really very considerable. Again, the "Centurion" was designed to go through the Suez Canal with the greater part of her coal on board; and is intended to have relatively high speed. It will be quite recognized, I presume, that to get high speed with a moderate draught involves considerable difficulty as compared with deeper draughts. That also affected the size of the "Centurion." But these are only examples of what I mean when I say that the conditions governing the designs of different classes of ships in the Navy are so manifold that there must always be a great number of types existent side by side; some large, some medium, and some small. If Captain Eardley-Wilmot desires to treat this subject of the dimensions of ships in a broad and general fashion, he must give more attention, not to mere displacement, not to mere length and breadth and draught, but he must formulate clearly what are to be the fighting and steaming qualities of ships necessary for fulfilling special duties in the Navy.

Admiral Sir MICHAEL CULME-SEYMOUR, Bart.: Several gentlemen having said they would like to hear something from Naval Officers who have been lately at sea, so that the discussion should not be confined altogether to gentlemen who have not had recent experience, I should like to say a few words. Now, with regard to the ironclads, I am very much inclined to agree with Captain Eardley-Wilmot that a size of about 10,000 or 11,000 tons is a size that is suitable for the Navy; and that, although it is essential that we should have larger and more powerful ships than any other nation, they should not be more than is necessary. The argument, that because a large ship may be destroyed by a torpedo, that, therefore, you should not build large ships, will not, I think, hold water. It may be a possibility, but the chances are against it. But what I principally wanted to say was a word with regard to the cruisers. I have studied this question a great deal, both whilst in command of the Channel Squadron lately and in command of the Northern Fleet last year, and I have come to the conclusion that what we want in a cruiser is that she shall go fast, that she should be able to go against anything, and that she should have plenty of coal. Now, I think if you asked Admiral Sir Geoffrey Hornby his opinion when he had command of what you may call the first manœuvres, he would tell you that the "Oregon" was invaluable, that she had no armour in any way to speak of, but that she could get information from anywhere. I was speaking to him the other day, and found that he was excessively strong on that point. What you do want is great speed and large coal power; protection and guns must give way to that. Mr. White says you cannot do everything; that one wants a lot of guns, that another wants a lot of coal, a third wants speed, another one plenty of armour, and another says it is too costly but very little. For my part, I should put down this formula, that the ship must steam fast, that she must have plenty of coal, and that the protection and guns must give way to that. The Americans are building cruisers to carry 2,500 tons of coal; the "Blake" is nowhere at all compared with them. That is what I hope the Admiralty will keep in view, that if you are going to have scouts, they must carry a great deal of coal, and they must steam fast, and I am not at all certain whether these auxiliary cruisers would not be a great deal better than the "Blake" and the "Blenheim"; for instance, the "Umbria" might steam 10 knots for three months without taking any coal on board. I think that is a very important point.

Mr. W. H. WHITE: The "Oregon" and other vessels alluded to, which might be used as auxiliary cruisers, have much greater displacements than the largest man-of-war cruisers ever built. The American cruiser to which Admiral Culme-Seymour referred as having a capacity of 2,500 tons of coal, if she has that 2,500 tons on board, will also be of greater displacement than any other cruiser that we have; although she is to be lightly armed.

Admiral Sir CULME-SEYMOUR: I only wished to put the general principle forward.

Mr. WHITE: What I mean is, that these are very large ships.

The CHAIRMAN (Lord Brassey): In concluding the discussion, I will venture to say a few words. Anything I do say, I say with great deference in the presence of Naval Officers, who alone are competent to advise the country on these subjects. But there are one or two general observations that I think I may venture to make. I am quite sure that Captain Eardley-Wilmot, in propounding the views that he has put forward in his paper, and which I am sure have been favourably entertained by this meeting, which, if not numerous, is certainly representative of the best ability in the Navy, does not imply any adverse criticism on the work that is now going forward in the Dockyards. The great programme of construction now in course of execution, and I am happy to say, near completion, represents as satisfactory and effective an application of that large sum of public money as naval wisdom could possibly devise. We have been reminded by one or two speakers that there is a considerable amount of excitement going on out of doors, upon which, in the calm serenity of this theatre, we can look with some degree of complacency. I may make one absolutely non-party observation in this theatre, and I will say this, that within our particular range of view, viz., the administration of the Navy, I do not believe it would have been possible to have administered the

Service more satisfactorily and more ably than it has been administered by the present Government. If they suffer a reverse at the polls, it will not be through their naval administration. The programme which is now in course of construction represents, as I venture to say, a thoroughly judicious application of public money. I cannot conceive that it can be considered that those great ships which are now being completed are any other than most valuable additions to the Navy, but the question which Captain Eardley-Wilmot raises has reference to the work of the future. What are we to do when we are drawing near to the completion of the present programme and laying out a scheme for another term of years? Captain Eardley-Wilmot, and I suppose he is carrying with him all his brother Officers, is strong on the importance of numbers, and he reminds us of the many great perils of naval warfare from which no ship, no type, the largest and most powerful, can be exempt. He has referred to the dangers from night attack by torpedoes; the danger of running ashore; the danger from fog; the danger from under-water attack by the ram, against which the first-class battle-ship is not more exempt than the "Barfleur" or the "Centurion," the type which he recommends for multiplication and for additions in any future programme. Having regard to these great dangers of naval warfare, it is, so far as it is possible, desirable to divide risks, and to have the advantage of numbers on your side. Looking to the desirability of having the advantage in numbers, Captain Eardley-Wilmot directs our attention to the "Barfleur" and the "Centurion," and he advocates that more ships should be built of that type. Captain May is doubtful on that point. He reminds us of the points of superiority which can only be secured by going to the large type of the "Royal Sovereign." Well, but in what respects are the "Barfleur" and the "Centurion" inferior to the "Royal Sovereign" type? They do not carry guns of the same calibre; they are armed with four 29-ton guns as against four 67-ton guns. That, no doubt, is an element of inferiority, but if the 29-ton gun is sufficient for the work that you want to do with your naval gun, it seems to me that the superior power of the 67-ton gun is not sufficiently material to lead you in all cases to say that you would build "Royal Sovereigns" rather than "Barfleurs." Well, then there are other points on which you may make comparison. There is the protection. No doubt the protection in the "Barfleur" is reduced to 12 inches. but that is a considerable protection. It is a protection against the most dangerous form of projectile, live shell, and I think I am not misinterpreting the views of the majority of the naval profession when I say that they would be content to go to 12 inches if, in accepting armour of that thickness, they could secure a considerable advantage of numbers. Then, if you make the comparison of speed, there is no inferiority in that respect. There remains the question of ability to contend with the sea, the power to keep up speed in all weathers, and the power to fight guns in all those circumstances of weather in which it is likely that a naval action would be fought. Well, undoubtedly, if this is the case, that the "Barfleur" and the "Centurion" are sensibly inferior to the "Royal Sovereign" type in ability to hold the sea and to fight guns in those conditions of weather in which you may reasonably expect a naval action would be carried out; then there is a very serious inferiority, and one which it would be difficult to accept even with a view of gaining in respect of numbers. In respect, however, of the difference in weight of the heavy guns and the thickness of armour, it does seem to me the inferiority is not of sufficient importance to make us hold to the larger type as against the smaller one in view of the great importance of making a gain in respect to numbers. On the whole, I shall hope in the programme of the future, while we shall not throw aside the most powerful types, we shall have a larger proportion of the "Barfleur" class than have found admission into the programme which is now in course of execution. In considering this question of large ships against small ships, it is undoubtedly exceedingly difficult to define what you are talking about when you are speaking of a smaller ship, and what you are talking about when you are speaking of a big ship. Those of us who hold the argument in favour of building a certain proportion of battle-ships of moderate dimensions with a view to a gain in point of numbers have no doubt been very hazy and indefinite in our course of argument, but at last, Mr. White has supplied us with a means of being definite. He seems to me to have produced a type that has immense merits, looking at it as exhibited to us in the

models which we had the advantage of seeing at the Naval Exhibition. I must say I was greatly attracted by the type, and inspired with the conviction that there at least we have found a remarkable expression of our views, when we are asking for the construction of a certain number of ships of moderate dimensions, together with these other large ships, of which he is the author, and which I am sure will be so valuable an addition to the Navy. A great deal has been said about cruisers. In endeavouring to grind down naval opinion into chapters in Naval Annuals, I have found myself following a different course with regard to the cruisers from that which I have followed in endeavouring to interpret the views of the majority of Naval men in relation to battle-ships. When we turn to cruisers, all the arguments seem to me to be in favour of big cruisers, and rather against cruisers of types which have been numerous represented in the Navy, and which seem to be insufficient in size to do the work of scouts to fleets satisfactorily. If a ship cannot keep her speed under all reasonable conditions of weather, and is miserably insufficient in coal endurance, she is useless as a scout for a great fleet. Then we ought to be precise upon this point with regard to dimensions, and I seem to be led to the conclusion that for cruisers for general service we ought not to go below 4,000 tons. There are other services for which we want small vessels, for which inferior dimensions would be sufficient; but it seems to me for cruisers for general service it is undesirable that the architect should be pinched below the limit of 4,000 tons. Immense ingenuity has been displayed in combining great fighting powers with high speed in less dimensions, but it is a *tour de force*, and I think anything but an economy. I think more money is spent in the intricacies of contrivance in order to get what you want in smaller dimensions than would be sufficient to give you the same things with less effort and more surely if you had only gone to work boldly and accepted the larger dimensions, which are really necessary to get all you require. I was glad to hear Sir Michael Culme-Seymour speak favourably of the powers of our mercantile auxiliaries to do service for the Navy. Of this I am confident, that if they could be spared from the work which they are doing in time of peace to help the Navy in time of war, there are great functions, of looking out, reporting, and gathering information, for which these ships would be exceedingly well adapted. It would be a dislocation of trade to call them in from the work they are doing in help of the defence of the country, but when great emergencies arise, we must accept inconvenience, and it is gratifying to know that besides the force we have in the Navy, which I trust we shall keep on building up so as gradually bring it up to the level of our requirements, there lies a force behind in the trade of the country, which is also of value and would be a most desirable supplement to the regular forces. I shall be, I am confident, interpreting the views of all when I assure Captain Eardley-Wilmot that the Institution is grateful to him for his paper. When it is published and circulated, and reaches the wide audience which it will then reach, it is certain to do a great amount of good, and, as I have said, set people thinking.

Captain EARDLEY-WILMOT: I am gratified to find that on the whole there is a concurrence with the views I have put forward; not that I intended to lay down any arbitrary law, but to enunciate certain points for discussion, so as to get opinions and to hear views on the matter. Admiral Long did not agree with what I said as regards the flag-ship of the squadron being more powerful than the other ships, because he thought it would make it a less homogeneous squadron. I did not mean that the flag-ship should be an entirely different ship in speed and helm-angle, but, looking to the importance of preserving the Commander-in-Chief intact, we might allow a little more weight to his ship. His conning tower, for instance, might be made almost impregnable, for an imperfect conning tower is almost worse than none at all. Then he alluded to the "Rurik," and said we ought to build cruisers to attack and overtake such craft. My view is that the "Centurion" is the answer to the "Rurik." She is built on purpose for distant stations and long cruises, and I believe the "Centurions" of the future will chase the "Ruriks" off the seas. Admiral Colomb truly said that the object of the paper was to stimulate thought and discussion, and that we should build in accordance with general requirements rather than cases of individual ships. Admiral Boys rather doubted the time I gave in which a line-of-battle ship could be built and

sent to sea in the old days. As a matter of fact I over-stated it. In the Crimean War a French line-of-battle ship was built at Brest and sent to sea in 120 days. That is an actual fact. Then as to torpedo effect on ships, Admiral Boys thought the large ship would come off better than the small ship. I do not think so. It is very much easier to add to the power of the torpedo than to add to the ship's defence, by increasing her size, against the torpedo. Then as regards the "Blanco Encalada," he said that was an exceptional case; there was great neglect in the look-out. Now, you cannot take these cases and say, "If this had occurred and that had occurred it would have been thus." You must take actual facts, and I have no doubt in the next war there will be just as many cases of carelessness as the case of the "Blanco Encalada." At Lissa you might have said that it was an extraordinary thing that the "Re d'Italia" had stopped her engines and was actually stationary at the time she was rammed. As a matter of fact, she was. She had gone ahead and then astern, and she was stationary at the moment that the "Ferdinand Max" ran into her. Captain May considers that the big ships will stand blockading work better than those of smaller dimensions. I do not think that follows at all. A ship can be built of 9,000 or 10,000 tons which can perform this service just as well as one of 14,000 tons. If you take actual ships of 9,000 tons, the "Hercules" or the "Sultan," they are perhaps more suited for this particular work than the more recent types. Of course, it is quite true to say that speed is more easily maintained by large ships, but in the "Admiral" class they can get excellent speed in a moderate ship. Take the "Collingwood," a ship of 9,500 tons. She had an exceptional speed over any vessel that had gone before her. As regards the "Centurion" not being able to compete with the "Royal Sovereign" in battle, it is impossible to argue on that point. I have no doubt most Officers would be ready to take the "Centurion" into action against the "Royal Sovereign" if necessary, as in the old days the two-decker successfully coped with the three-decker. I was very glad indeed that Mr. White did me the honour to come this afternoon and make some remarks on my paper. He considered it was rather a left-handed procedure fixing the displacement before laying down what the attributes or the qualities of ships should be. I rather thought that I had followed this latter course. I took the "Centurion" and the "Barfleur," and referred to their qualities *seriatim*—armament, protection, speed—and said that in each case it was sufficient, that we did not want more, and the result was a ship of 10,500 tons. Lord Brassey has alluded to the numbers we want. Our requirements are not the same as those of other nations. Other nations may be strong in one point only, but we have to be strong all over the world, and to ensure it we must have a large number of ships. No nation can afford to build many battleships of 14,000 tons. Then why should we stop at 14,000? Why not go to 20,000 tons? You can have a much more powerful ship of 20,000 tons than the one of 14,000 tons. Where is the limit to be? We must draw the line somewhere. I was very glad, indeed, to find that an Admiral, who has lately been in command of a squadron, did agree with what I said as to size, because he has had actual experience of these ships of moderate dimensions in all weathers. Therefore any views of that sort are very valuable indeed. What he said about cruisers no doubt is perfectly true. We want fast vessels and ability to keep the sea for a length of time, which is entirely dependent on coal. I think most people will agree that until recently many of our cruisers were over-weighted with guns, and I think it has come about in this way. The old 32-pr. shot had a calibre of 6 ins., and we desired to perpetuate that. But the 6-inch gun of to-day is not the 32-pr. of the past. It is about double the weight. In cruisers gun power must be sacrificed to speed. It was a great gratification to me that Lord Brassey should kindly have consented to preside this afternoon. His multifarious engagements do not often permit him to indulge in a little recreation of this sort. Therefore, I cannot conclude without expressing my thanks to Lord Brassey—and I am quite sure you will join in this expression—for his kindness in coming and taking the chair this afternoon, and giving us the benefit of his valuable opinions.

DESCRIPTION OF THE "NAVIGATION SECTION," ROYAL NAVAL EXHIBITION, 1891.

By Captain HENRY H. WASHINGTON, R.N., Hon. Secretary, Navigation Committee, Royal Naval Exhibition.

"It is on the Navy under the good providence of God that our wealth, prosperity, and peace depend."

THIS motto, which was adopted from the preamble to the Naval Discipline Act, better known as the Articles of War, was adopted by the Royal Naval Exhibition, which opened under Royal patronage in May, 1891.

The object intended was to convey to the general observer some conception of the rise and progress of the Navy, and to illustrate the naval history of the nation from its earliest existence by presenting to the public a complete chronological series of loan and trade exhibits of naval and maritime matter, the initial idea being to present not only the present condition of the Navy, but the steps by which that condition has been reached.

It was with this object in view that chairmen were elected and sub-committees formed of energetic naval Officers and scientific gentlemen to carry this into effect, and it was owing to the hearty good will, loyal co-operation, good judgment, and intelligence of all concerned that this was so successfully accomplished, being a singular proof of the power which lies in the naval Officer of dealing with the unexpected when he meets with it.

The thanks of the Navigation Committee are due not only to public departments and private firms, but especially to the following: the Lords Commissioners of the Admiralty, the Council of the Royal United Service Institution, the President of the Royal Naval College and the Royal Observatory at Greenwich, the Corporation of the Trinity House, and the Council of the Meteorological Society, for their zealous co-operation and assistance, and to all those scientific gentlemen who contributed interesting loans.

The Exhibition was divided into four main sections:—Arts, Navigation, Models, Ordnance.

It is proposed to deal with the Navigation Section, which included all the exhibits in the Franklin and Cook Galleries, and sub-divided as follows:—(a) Arctic; (b) Signals; (c) Lights, Buoys, and Beacons; (d) Marine Meteorology; (e) Hydrography; (f) Compasses; (g) Navigating Instruments.

I must here acknowledge that I am indebted for information on navigation to several members of the United Service Institution who have spoken on the subject.

a. *Arctic.—The Franklin Gallery.*

On entering the gates of the Exhibition from the main entrance, this gallery is seen on the left hand, its name being very appropriately chosen in memory of the distinguished Arctic explorer, Sir John Franklin, K.H. It contains the Arctic sub-division of the Navigation Section, being an exhibit of all the appliances used in Arctic navigation, many of them having been actually in use in those regions.

Many interesting relics illustrative of the history of Arctic research are displayed in this section, and especial attention should be given to the touching and unique remains of the Franklin Expedition.

The following remarks are taken from the "Story of the Franklin Search," which is told in the most touching and thrilling manner by Lady McClintock.

The subject of Arctic discovery early engaged the attention of Englishmen; King Alfred the Great wrote about it some years ago.

The dream of our fathers was to discover the North-West Passage to China and India round North America through the Arctic Region by sea. This passage has been found to exist, but so blocked by ice as to be impracticable, and the discoverers "forged the last link with their lives." When the great Canadian highway was opened in 1885, England clasped her girdle round the world, thereby completing the circuit of the world under our flag.

The first object met with is a full-sized representation of the cairn erected by the crews of the "Erebus" and the "Terror," belonging to the Franklin Expedition which left England in June, 1845, on Victory Point, lat. $69^{\circ} 37' 42''$ N. and long. $98^{\circ} 4'$ W. In this cairn they placed their record dated April, 1848, which was found eleven years later (1859) by Sir Leopold McClintock, this record being the only written information we have ever received of them.

In the central space beyond the cairn, the relics recovered from the lost expedition, including the record, were arranged in glass cases upon a large table. They consisted of a miscellaneous collection, everything, in fact, which an expedition of the kind might leave behind. These objects were all catalogued at length in the Official Guide.

In the centre stood a trophy of fourteen flags, all being banners carried by sledges employed in the Franklin search.

The remaining central space of the gallery was occupied by a representation of an ice-field or floe, on which was exhibited in realistic form the mode of sledge travelling adopted in our Arctic expeditions; the figures were all rigged out with snow goggles, cavernous mittens, and other articles essential to such high latitudes, whilst the encampment was represented by the interior of a tent with the weary inmates in their duffle sleeping suits, the whole tableau forming a worthy illustration of the means by which British seamen have discovered and explored many miles of frozen shores otherwise inaccessible.

The left wall was covered with polar charts and cartoons of Arctic

and Antarctic scenery, and on either side of the gallery were exhibited portraits of Arctic explorers, beginning with Sir Hugh Willoughby, who perished with all his crew in 1554, and continuing down to Cook, Parry, Franklin, and Officers of our own day, whilst from the roof was suspended a balloon similar to those used in the Franklin research, 1852-53. Bundles of printed papers, describing where relief ships and depôts of provisions could be found, were attached to an ignited slow match which trailed from the balloon, and were thus by degrees set free to be scattered by the wind in hopes that some survivor might find them. It was a clever invention as a means of conveying communications across vast tracts of snow when any other means would fail.

In a large glass case on the right of the gallery were shown the sledge banners used by the North Polar Expedition under Sir George Nares, K.C.B., including the Union Jack which they carried beyond the furthest north point which had been previously attained, viz., lat. 83° 20' 26'', Markham.

On either side were counters upon which were exhibited many articles of interest, such as Arctic birds and animals, and Antarctic birds, Esquimaux implements, kayaks, and curiosities, Greenland woodcuts; Arctic and Antarctic sketches and paintings, especially those of Beechey, Inglefield, and May; geological specimens, meteorological instruments used in these regions; whilst high above the portraits were numerous heads and horns of Arctic animals. The silver model of the steam yacht "Fox," in which Sir Leopold M'Clintock discovered and brought home the "Franklin Record," completes the description of this gallery; and I may here notice the iceberg model, which is illustrative of life in the Arctic regions, and which stood in the grounds of the Exhibition. It represents the "Investigator," Captain McClure, R.N., "nipped in the ice." It was by means of the sledge parties of this ship that the greatest discovery of the century was made, namely, the existence of the North-West Passage, and which recalls the words of General Charles Gordon to mind, viz., "England was made by her adventurers."

Cook Gallery.

Continuing our route through the Arts and Relics Section, and ascending the stairs at the end of the Howe Gallery, we reach the Cook Gallery, being very appropriately chosen in memory of the greatest of English navigators, Captain James Cook, F.R.S. It contains all the appliances in connection with the art, science, or handicraft of navigation, and is devoted to all the exhibits of this section.

In some respects this is a section apart from others, as it is devoted to arts of peace instead of implements of war, and its international character is symbolized by being decorated with flags of foreign nations bearing the names of great maritime navigators and explorers thereon, such as La Pérouse, Vasco de Gama, Columbus, Behaim.

A famous American writer says, "A few years after the peace of 1763 the great navigator Cook began his memorable series of voyages, and surveyed strange lands, barbarous, which, after a time, were transformed into other Englands, vigorous children of this great mother of nations."

Sir William Thomson says that "Navigation" means finding a ship's place at sea and of directing her course for the purpose of reaching a desired place. It consists of three modes:—1st, pilotage; 2nd, astronomical navigation; 3rd, dead reckoning and sounding.

The history of navigation (Markham) consists chiefly of the stories of the search for longitude, the discoveries of the properties of the magnet, of the conversion of the old portolani into our almost perfect modern charts.

The manner in which sailors of old navigated their ships from port to port in safety has always been a marvel to modern seamen.

In the Viking days hawks and ravens were carried, and in case of doubt the birds were let loose and, winging their way to the nearest land, guided thither the bewildered mariners.

The craft of lodesman or leadsman was the introduction of specialism into seafaring life. The compass, which was first used by the Chinese in time of remote antiquity, was probably introduced about the 13th century, before which the Pole-star had been their principal guide. In the early time of navigation globes became a part of the scientific furniture of every well-equipped ship. These were followed by books on navigation. Later on the ancient mariner guided his rickety craft by three L's—log, lead, and look-out; when certain astronomical data became available, another L—latitude—was added. In the present day this regiment of L's is augmented by a fifth and very important comrade, namely, longitude. The early charts and sailing directions combined were quaint and curious productions. Nevertheless, the explorer probably relied on dead reckoning (course steered and distance run); much also was left to guess work. The history of instruments, from the astrolabe to the sextant, the map on Mercator's projection, discovery of variation of the compass by Columbus, and of logarithms by Lord Napier, all led by degrees to the "Nautical Almanac," and the marvellous self-recording log, sounding machines, &c., of the present day. It is to such instruments that we are indebted for the security of navigation, and the reduced casualties and disasters at sea in modern times, all of which make the voyage by sea still a possibility.

b. *Signals* (including Lights and Signals for Preventing Collisions).

"Light, more light" is the cry of the anxious skipper when feeling his way up Channel with every two craft in three flitting by with scarce a glimmer. Put off the pilot and then douse the glim seems to be the unwritten law of people who will risk valuable cargoes and priceless lives in order to save sixpennyworth of oil.

This sub-division is not large, as the apparatus employed is not

subject to much change. On the left is shown a series of lights and fog signals (Admiralty) used in the Royal Navy, and opposite, on the right, are the trade exhibits of Messrs. Nunn, Harvie, Ridsdale, Holmes, Chance, which are so well known that they hardly need a word.

"The lamp with a thousand rays" is the name of a genuine article. It is the Paragon Double Reflector Lamp of Captain Loftus, Siamese Navy. It is a circular and parabolic curved light.

In the centre, Messrs. Pain and Sons had a very artistically arranged pyrotechnic exhibit. He also contributed to the entertainments by his very successful firework display in the grounds. His neighbour, Messrs. Wolff, of Southampton, exhibited a brilliant display of national, naval, and yacht flags. The making of flags was also shown.

He also kindly furnished the flags of foreign countries, emblazoned with names of great navigators, which adorn this gallery.

Admiral Colomb says, the whole of this group of anti-collision lights is the growth of forty years' invention. From the earliest time until 1848, when vessels approached one another at night, two white lights in lanterns were shown vertically on the port or left side, or a single white light on her starboard or right side. About 1848, steamers carried permanently the white light at mast head with a red light on left side, and a green light on right side. Then came steam whistles, fog horns, ringing of bells, beating drums, guns, &c., for denoting the presence of ships during fog; anchor lights.

In signalling proper between ships at sea, progress is best illustrated by the group of Signal Books of 17th century in Charles II's time, from the code used by the Duke of York down to the inventions of Admiral Colomb.

Signals were made in daytime by means of coloured flags, and at night by groups of white lights in different forms. It reached its highest development at the hands of Sir Home Popham in 1816. It was from an edition of this book, in 1803, that Nelson's celebrated signal was made.

The semaphore is now largely used instead of flags in daytime, and was in existence half a century before being adopted afloat in the Service. Mr. Redl, an Austrian gentleman, was the first to conceive, forty years ago, the idea of a signal system which might be nearly uniform in daylight, by night, and in fog. This is represented by our present flashing system.

c. Lights, Buoys, and Beacons.

This sub-division is headed by the full-sized model of the Eddystone Lighthouse in the grounds of the Exhibition. The Eiffel Tower as it were of the Naval Exhibition was designed by Sir Jas. Douglas, F.R.S., and built by Mr. D. Charteris. It is precisely similar to the original structure. The height is about 170 feet to top of the lantern, and surrounded by a gallery from which a beautiful bird's eye view was obtained. Nearly 100 tons of iron and steel were

employed in its construction, which was covered with Portland cement on a steel lathing, and painted to resemble stone. It was finally attached to strong anchor plates and embedded in cement concrete, thus ensuring its stability. An hydraulic lift was provided by which visitors could ascend to the top of the platform, and send messages to their friends by means of specially prepared post-cards. The light, which is far more powerful than the actual one of oil, is termed Double Group Flashing, Dioptric Light of the Fourth Order, and was composed of Messrs. Chance's refracting lenses only, and arranged for an electric arc light, the current of which was 500 ampères and 60 volts, producing a light equal to 5,000,000 candles, the most powerful light in the world. The light revolved every 30 seconds, the two flashes being separated by an interval of 4 seconds, and the group by an interval of 21 seconds. The revolving apparatus by Kenward Hopkinson Type. In comparison with this marvellous development is shown the original "cressett" or grate for a beacon light in the year 1680, in which a coal fire was burned every night from sunset to sunrise, and which in the early days of navigation warned the navigator of his approach to St. Agnes, in the Scilly Islands.

It is interesting to compare this also with Trotter's automatic light, and Chance's harbour occulting white light occasionally shown red.

The great gas and bell buoy, containing sufficient for two months when alight, was another development enabling the navigator to thread his thread his way through intricate channels at night and in fog.

Models of all the existing appliances for lighting and buoying channels, marking dangers, &c., are shown, as also a large chart illustrating the system of buoying channels. In this particular, the Exhibition is indebted to the kindness and exertions of the Elder Brethren of the Trinity House, assisted by the Commissioners of Northern Lights, for the interesting display of models of lighthouses from the first Eddystone of Winstanley down to the present day.

The history of modern lighthouses commences with the Cordonan Tower in the Bay of Biscay, 1611, and next comes the Eddystone.

The "Eddystone" story, although told so often before, deserves repeating.

The first structure, shown in the model was built by Winstanley, of Essex, in 1694, and destroyed by the great storm in 1703, when the brave and devoted constructor with workmen and keepers perished. The second structure shown in the model was built of wood by Mr. Rudyerd, a silk mercer, of Ludgate Hill, in 1708. It was destroyed accidentally by fire in 1755, when the keepers were rescued. The third structure was built of stone by John Smeaton, F.R.S., in 1759. Candles were superseded by oil lamps, and reflectors in 1810, and a lenticular apparatus adopted 1845. The lenticular system was introduced by Monsieur Fresnel in 1819. An original model of Smeaton's Eddystone, made by himself, was also exhibited.

The fourth and present structure was built on a portion of rock eastward on account of the gneiss rock of Smeaton's tower having

become seriously damaged by the sea. It was designed by Sir Jas. Douglas, F.R.S., and completed in 1881, the first and last stone being laid by H.R.H. the Duke of Edinburgh. The light is lenticular.

The ancient Pharos, which shone upon many a Roman galley, A.D. 53.—This tower is now standing within the Castle Yard at Dover, and is mentioned by early writers as the remains of a Roman Pharos.

Nore and Dudgeon Lightship, 1731–36.—This model represents the first lightship moored on the English coast for guidance of mariners.

St. Catherine Lighthouse.—Originally established in 1780. Furnished with electric light in 1888. It is believed to be the most powerful electric light in the world.

Commissioners of Northern Lights: Bell Rock Lighthouse, built by Robert Stevenson, F.R.S.E., F.G.S., &c., in 1811. Now the oldest rock lighthouse tower in the world.

Hyper-radiant lens of 1,330 mm., suggested by Messrs. Stevenson in 1869, and made in 1885, was tested at South Foreland and found to be the most efficient lighting apparatus yet made, and adopted since both at home and abroad.

This exhibit of the Eddystone model was the means of furnishing the idea for the opening ceremony of the R.N.E.

H.R.H. the Princess of Wales, who unlocked and opened the door of the miniature model lighthouse, which operation caused a brilliant light to appear in the lantern and unfurled a small flag at the summit; simultaneously a gun was fired, and the Royal Standard hoisted at the top of the full-sized model in the grounds, as an announcement that the Exhibition was opened.

Hopkinson's triple-flashing light is the letter S of the Morse-Colomb flashing alphabet. The collier skipper would ask: "Bill, was that a S or a J, or a H or a E?" Bill, if he was well up, would reply: "Captain, them is things as no fellow can understand."

d. *Marine Meteorology.*

In this sub-division the main points of the science are fully illustrated by charts exhibiting the movements of air and water. There are also charts displaying the varying atmospheric pressure and temperature of the sea surface. The actual monthly current charts are entirely novel, none such having been before attempted.

The daily weather charts of the British Isles were also shown, and the Meteorological Office kindly undertook to change them regularly whilst the Exhibition remained open.

Perhaps the most attractive feature in this section was the ingenious contrivance of Mr. Clayden, F.R.M.S., whose moving and realistic models of "Ocean Currents," whereby the "winds and currents were reduced to rule, if not to obedience."

No. 1. Working model, showing the Gulf Stream and other great currents in the Atlantic.

No. 2. Working model, showing the currents of the Indian Ocean and change of monsoon.

It consists of a flat, wooden tray, covered at bottom with map of the Atlantic on Mercator's projection, with the land and sea represented by filling the part which represents the ocean with water, and the land masses cut out of wood.

Air is forced into a box by a foot blower, and, issuing from a series of tubes, represents the prevailing winds. The movement of the water is shown by floating particles of lycopodium powder. The motion is entirely produced by jets of air impinging on the water, and arranged so as to imitate roughly the average direction of the wind.

e. *Hydrography.*

This sub-division embraces a series of charts, from the earliest extant to one of the present day, in process of preparation by the engraver, which are exhibited by the Hydrographic Department of the Admiralty.

Also a chronological exhibit of time-keepers, with a collection of various surveying instruments, sailing directions, and deep-sea sounding machines.

Hydrography first assumed a definite form in 1417. Two hundred years after the discovery of the compass, Prince Henry of Portugal founded an academy for pilots and mathematicians at Sagres, with Marstro Jaque as president. Instruction was given in use of astrolabe and method of finding latitude by altitude of sun, having previously constructed tables of declination.

Mr. Clements Markam, C.B., F.R.S., in his very interesting paper on Naval Science, tells us that "an acquaintance with the thirty-three editions of Ptolemy, from 1472 to 1572, with their "*Tabulæ Novæ*" is a foundation of the knowledge of the history of chart making. These were superseded by the portolani, or compass charts, the most important contribution to cartography of the Middle Ages. The name portolano originally meant a book of courses or sailing directions.

As early as 1311, charts of the Mediterranean were drawn for navigators which were nearly correct. Portolani charts were drawn for practical purposes, and were usually on parchment, and richly ornamented in gold and colour (1497 to 1556).

A very fine example drawn by Freducci, of Ancona, dated 1555, was exhibited by Lieutenant Hamilton, R.N.

In 1541, Mercator first made a name by his famous globe at Antwerp, and after many adventures he published his famous chart of the world at Dinsburg in 1569, but the true principles of Mercator's chart were not demonstrated till half a century later, by Wright, of Cambridge.

The "*spiegel*" or mirror charts of the Dutch, which were published in 1584, 1595, were translated into English by Ashley, and were the basis on which our own charts were constructed in the 17th and 18th centuries.

Since the time of Captain Hurd, the first Naval Hydrographer, our charts have been adapted to the requirements; and as regards clearness and accuracy I believe they are nearly perfection.

An acquaintance with the series of maps from the days of Ptolemy, following on the course of discovery with the portolani of Italy, the "spiegel" of Holland, and the Neptunes of France, with the earlier work of Grenville Collins and his successors in England, and with the later developments of our hydrographers, forms the previous history of chart drawing.

Amongst the most interesting was a chart (lent by the Marquis of Salisbury) made by Captain Burrough, of H.M. Fleet, in Queen Elizabeth's time, dated 1588, of the entrance to the Thames; also a chart (lent by his Grace the Duke of Leeds) showing the track of Sir Francis Drake's squadron to the West Indies and back, 1585; old and modern surveys at different periods from 1681 to 1890; several charts of Cook's survey, 1765-68-70-80; chart of the world, showing oceanic depths, 4,550 to 4,650, in the Pacific Ocean; a collection of portolani charts, 1530, showing Magellan's track, 1519-22; a portolano map of the world, 1555; the "Mariner's Mirrour," 1588; the "Lightening or Sea Mirrour," 1670, with instructions for showing cross staff and astrolabe; a sea atlas, by John Sellar, Hydrographer to the King, 1675; Johnstone's "Royal Atlas of Modern Geography."

The process of engraving charts on copper plates was demonstrated by an engraver at work belonging to the Hydrographic Department.

Here is also a complete collection of the various instruments used in surveying, being part of the equipment of H.M. surveying ships, from a theodolite to a deep-sea thermometer.

In this sub-division are shown specimens illustrating the gradual development of the chronometer, by a chronological exhibit of time-keepers from the Royal Observatory, Greenwich. Here may be found the timekeeper which gained for Harrison, the inventor, a reward of 20,000*l*.

In the year 1714 Sir Isaac Newton mentioned various schemes to the House of Commons for finding longitude at sea, and a reward was offered of 20,000*l*. for a determination of the longitude to within 30 geographical miles. John Harrison, whose invention gained the 20,000*l*., was a native of Yorkshire, and by trade a carpenter. In 1735 he settled in London, and devoted himself to horology. He died in 1776. His invention was tested in 1761 on a voyage to the West Indies, and on arrival at Jamaica, at Port Royal, the longitude of that place as shown by the watch only differed 5 seconds (about 1 nautical mile) from the truth. In this department may be also seen the best handiwork of Dent, Arnold, Poole, Kuhlberg, Kendall, and others. Mr. E. J. Dent constructed the Westminster clock. He was born in 1790, and died in 1853.

In sounding machines, amongst the most important are Lucas's automatic sounding machine, and various patterns of gear in connection with deep-sea sounding operations, from the deep-sea sounding lead to Thomson's sounding instrument, and James's "Marine

Sentry," " an automatic shoal indicator," to Massey's sounding machine. The common deep-sea lead and line is the most simple, the most reliable, and probably the most ancient, instrument of navigation.

f. *Compasses, Astrolabes, &c.* g. *Nautical Instruments, Books, &c., used in Navigation.*

Still passing on, we come to a little side chamber just opposite Gordon House, where are exhibited compasses, astrolabes, cross staves, &c., and other instruments of torture. The history of the compass is made visible in this sub-division, from the suspended magnet and loadstone down to the beautiful perfection of Sir William Thomson or the Admiralty compass. It was first used by the Chinese in times of remote antiquity, and by Mediterranean seamen in the 13th century. The discovery of variation and of dip with the phenomena of terrestrial magnetism is also part of the subject, and the discovery of the variation of the compass by Columbus was a memorable epoch. Here I am indebted to Mr. Clements Markham. The most ancient nautical instrument known to us was the astrolabe, in the 14th century. It was first adapted for use at sea by Martin Behaim, of Nuremberg. It was difficult to use at sea, and Vasco de Gama found it necessary to go on shore before he could find his latitude with one. Magellan used them in 1519, and was supplied with seven astrolabes and twenty-one quadrants. Sir Robert Dudley, a distinguished Officer in Queen Elizabeth's time, invented one in 1596. The cross staff, by Werner, of Nuremberg, in 1514, succeeded the astrolabe. It was most cumbrous, and required at least two assistants. The back staff or Davis quadrant, a later instrument, was the invention of John Davis, the Arctic explorer, and was in use in 1740. In 1653 William Oughtred invented the horological ring. In 1730 John Hadley constructed the first reflecting quadrant, which became a sextant by the extension of the arc in 1757. Globes were in the early times of navigation the chief vehicle of instruction, and became a part of the scientific furniture of every well-equipped ship. Sir Martin Frobisher, in his expedition of 1576, used one, as well as a *sphæra nautica*. Globes were followed by books on navigation, chiefly Spanish works of Cortes and Medina. In the reign of Elizabeth English works followed. For instance, "The Regiment of the Sea" was the first English book on navigation, by William Bourne, 1577, wherein is described the use of the log and system of marking it, as well as how to use the cross staff and astrolabe; and the most recent being "Raper's Navigation," nineteen editions being published from 1840 to 1891.

The first Nautical Almanac of Maskelyne made its appearance in 1769. Previous to this time the Ephemerides of Regiomontanus in the 15th century, and in the reign of James I that of Origanus and Searle; an interesting collection of these books was exhibited, as well as the instrument called a log, by which the speed of a ship through the water is measured. The common log and line have probably been

in use for more than three centuries. Massey's Patent Log is a clever invention since 1808.

Amongst the trade exhibits in this section may be noticed those of Hughes and Son, Cary and Co., Dent and Co., Steward, and the electrical log of Granville, exhibited by Messrs. Elliott Brothers.

Sir William Thomson's compass and sounding machine were exhibited by Messrs. White, of Glasgow.

Specimens of all these instruments were exhibited, especially the following:—Chinese and Japanese compasses, by the Hartley Institute, Southampton; binnacle and azimuth compasses, by the Admiralty; Earl of Caithness's compass, Barlow's correcting plate, 1823, and a diagram illustrating the magnetism of iron ships, by Captain Mayes, R.N.; the Earl of Morton exhibited a compass, sun dial, and astrolabe, of 1590: also a Persian astrolabe, by the Royal United Service Institution, and various others; a Davis quadrant or back staff, down to the sextant used by Captain Fitzroy, R.N., in H.M.S. "Beagle," in 1831-36.

Captain Hull says: "A practical sailor uses compass and sextant together. The pilot marries the sextant and compass together, and so obtains a numerous progeny of reliable positions. The sailor looks upon his sextant as a good sportsman does upon his gun. The compass is his dog, and points; the sextant is his gun, and brings down."

NAMES OF MEMBERS who joined the Institution between the 1st April and the 30th June, 1892.

LIFE MEMBERS.

Elliot, Walter E., Lieut. R.N.	Barter, C. St. L., Major Yorks L.I.
Wright, Philip N., Lieut. R.N.	Mason, J. F., Capt. Oxf. Yeo. Cav.
Gibbons, Frederick K. C., Lieut. R.N.	Foakes, E. T., Capt. 3rd Bn. Worc. Regt.
Dawkins, J. W. G., Capt. R.A.	Ryan, Frank E. C., Lieut. R.N.
Rew, A. R. C., Lieut. N. Staff. Regt.	Banon, F. L., Capt. Shrops. L.I.
Montgomery, H. M. de F., Lieut. R.A.	Bellairs, N. E. B., Lieut. R.A.
Farquhar, Arthur M., Commr. R.N.	Long, Bernard, Sub-Lieut. R.N.
Young, J. R., Lieut. R.E.	
Walter, R. L., Capt. 7th Hussars.	

ANNUAL SUBSCRIBERS.

Whitehill, S. J. K., Gen. Ind. Staff Corps.	Hornby, Sir Geoffrey T. P., G.C.B., Adm. of the Fleet, A.D.C. to the Queen.
Whitehill, C. S. S., Major K. O. Yorks L.I.	Wemyss, F. C., Col. 3rd Bn. W. Rid. Regt.
Elliot, G. C., Lieut. 3rd Bn. Rl. High'rs.	Rhodes, E., D.S.O., Capt. Rl. Berks Regt.
Haldane, J. A. L., Lieut. 2nd Bn. Gord. High'rs.	Hughes, C. F., Col. Ind. S.C.
Edye, L., Major R.M.L.I.	Hanbury-Tracy, E. T. H., Lieut. Colds. Gds.
Gordon, F., Capt. 2nd Bn. Gord. High'rs.	Rawlinson, H. S., Capt. K.R.R. Corps.
Charrier, P. A., Lieut. R. Mun. Fus.	Sanderson, J. C., Capt. Hon. Arty. Company.
Payne, H. C. B., Lieut. N. Staff. Regt.	Bayly, W. H., Col. Rl. W. Kent Regt.
Smith, Edmund H., Lieut. R.N.	Groves, J. Percy, Lt.-Col. Rl. Guernsey Arty.
Cave, C. D., Major Staff. Regt.	Stisted, C. H., Capt. Rl. Scots (Loth. Regt.).
Waller, E. H., Lieut. 1st Bn. R. Fus.	Maunsell, G. W., Capt. Rl. W. Kent Regt.
Somerville, A. A., Capt. 4th V.B. Oxf. L.I.	Fyler, A. E., Col. late Rl. W. Kent Regt.
Bacon, Reginald H. S., Lieut. R.N.	Williams, A. H. W., Maj.-Gen. R.A.
Nelson, H. S., Capt. R.A.	
Blake, Herbert A., Lieut. R.N.R.	
Oswald, W. A., Lieut. Ind. S.C.	
Mumby, C., Col. 3rd V.B. Hampshire Regt.	

FOREIGN SECTION.

THIS portion of the Number, hitherto the Occasional Notes, has now become the Foreign Section, and is reserved for articles, either original or compiled, on professional subjects connected with Foreign Naval and Military matters; also for notices of Professional Books, either Foreign or English.

The Council of the Institution wish that this section shall be developed still further, and I have undertaken to continue my Editorship during the current year, with a view of aiding them in carrying out this work. It seems to me possible to make this section, and consequently the Journal, the means of keeping our Members acquainted with all naval and military progress abroad *pari passu* with that progress; and I shall be glad to receive from members of both Services, including in the latter those of the Auxiliary Forces, suggestions, information, or offers of assistance.

It is desirable, further, that I should state that, as regards editing the Naval matter in the Section, I shall have the aid of Naval Officers, thoroughly competent to give good advice and to pronounce sound opinions.

It must, however, be borne in mind that, as the change from a quarterly to a monthly issue has been made in order to ensure the more prompt publication of the Lectures after their delivery than has hitherto been the case, the Foreign Section will, as a rule, be restricted in extent during the Lecture season in the first half of the year, and will be prominent in the second half.

It is requested that communications and books for review (the latter under cover to the Librarian) may be addressed to me at the Royal United Service Institution, Whitehall Yard, London, S.W.

LONSDALE HALE,

Colonel R.E. ret.

THE LAGOS EXPEDITIONARY FORCE IN WEST AFRICA.

By Captain Hon. A. S. HARDINGE, the Royal Scots Fusiliers.

IN the subjugation of the King of the Jebu and the overthrow of his capital, Jebu Odi, a blow has been struck on the West Coast of Africa, which may be expected to have a lasting and beneficial effect in the overawing of the natives with the power of our rule.

It should also, without doubt, exercise a wide-spread influence in deterring the multitudinous tribes, resident along that coast, from again resisting our authority.

For the last twenty years complications have arisen between successive Governors of the Colony of Lagos and the Kings of Jebu, anent undue taxation, and ultimately the complete blockade of trade passing through their territories.

Situated as it is, the Colony of Lagos may be fairly said to be wholly dependent for its supply of trade, and thereby its revenue, on the Jebu territories, since all the big trade routes from Ibadan and the interior converge by Saargemu and Jebu Odi to the Lagoon, and thence to Lagos.

From time to time palaver has succeeded palaver, promises and treaties have been signed only to be broken as soon as made. The closing of the trade routes has perplexed the minds of more than one Governor.

The Ibadans, a strong and warlike tribe, situate to the north of the Jebu territories, feeling the want of an outlet for their trade, and finding the routes to the Lagoon closed to them, have from time to time volunteered to take the law into their own hands, and settle their differences with the Jebus. They, however, have only been deterred from carrying this project into effect by our repeated assurance that we would coerce the Jebus by soft words and European diplomacy. Lastly, we had recourse to offering them a tribute of 500*l.* per annum, which offer, however, was indignantly refused.

Meanwhile the all-powerful Chamber of Commerce in Liverpool, represented by merchants of vast wealth and interests, began to be alarmed at the growing decrease of trade available from their habitual resources. This trade consists chiefly in an interchange of ivory, indigo, palm-oil, and kola nut for many coloured clothes and spirits. This palm oil forms one of the principal commodities of import in the vast commercial metropolis of the north.

No sooner had the shoe begun to pinch in Liverpool, and commercial interests were at stake, than the Colonial Office decided that stringent measures of a more decisive kind than had hitherto been resorted to were necessary for opening up the trade routes. The

War Office was conferred with, and it was deemed sufficient by the authorities to rely solely on the local forces, as the climatic influences have such a deleterious effect on Europeans.

The Adjutant-General, Sir Redvers Buller, with his world-wide experience, however, decided upon sending out six Special Service Officers to form a stiffening to the native levies. He also appreciated the necessity of having one Officer for the control of every thirty men in bush warfare.

These Officers, owing to the proximity of the rainy season, during which operations were held to be impracticable, were despatched at three days' notice. They arrived after three weeks' sea voyage to find the expedition standing still, awaiting the arrival of 100 West Indian troops from Sierra Leone.

This delay, though wearisome and irksome at the outset, was perhaps productive of good, as the proverbial lethargy and apathy inherent in those resident on the West Coast was too apparent here.

No preparations had been made for an immediate advance, the Gold Coast constabulary had arrived, and Colonel Scott, C.B., an Officer of much experience, and who had already seen much service, had just taken over command of the expedition. Up to the time of his arrival, however, no corps of carriers had been organized; the guns, their ammunition, mode of transporting them, &c., had not as yet been fixed on, nor had any definite scheme been discussed as to the mode of procedure or order of march during the advance through the enemy's country.

Colonel Scott, however, lost no time in ensuring the ultimate success of the expedition. He issued his orders to the commanders of each unit, and left them to work out the necessary details.

All these minute dispositions were viewed rather in the light of being superfluous, an opinion being prevalent that to wait for the reinforcement of West Indian troops from Sierra Leone was an idea born of ignorance, and that 1 Officer and 50 men was an ample force with which to march through the country to the capital, and thence to summon the King to agree to our terms.

After the lapse of three weeks the West Indian troops arrived, and everything was ready for an immediate advance; even one or two field days had been held to give the Houssas some idea of their conduct on the line of march; they were also practised as much as possible to fire by word of command, and by sections.

Of the 100 men and 3 Officers of the West Indian troops sent down, only 42 men and 1 Officer were fit to proceed to the front; the remainder having already succumbed to fever. These troops cannot be said to be well adapted to bush marching, they require the same rations and commissariat arrangements as European troops. Spats and European shoes are not conducive to great powers of marching when worn by natives; and without possessing the inherent pluck of the white man to struggle and shake it off, they succumb as readily to the ravages of fever as the European.

In a campaign, however, where owing to the conditions of the country, the length of the column, of necessity, varied in proportion

to the amount of transport, such considerations were of primary importance. In this respect the Houssas possess insuperable advantages. Their food is the food of the country. They carry on their person supplies for four days, in addition to their kit and eighty rounds of ammunition. Also, they are quite impervious to any climatic influences.

The column, when in motion, was over a mile in length, and its rate of progress proportionately slow. The route on all sides was surrounded by impenetrable bush, the greater part of which was too thick to allow of flanking parties being detached to act as scouts. There were, however, innumerable by-paths branching off to both flanks, which admitted of the scouting operations being carried out with great success, and thereby the safety of the column ensured. In some parts, however, the track would assume a more open aspect; this was more especially in the vicinity of villages. These open spaces were everywhere in a high state of cultivation. Mealies are here the chief product of the soil, the crops of which were on the point of approaching ripeness. Owing to the great height, viz., 8 to 10 feet, to which these mealies reach when full grown, the view was just as much impeded and facilities for manœuvring quite as difficult as when the track led its tortuous course through the bush.

It can readily be understood how the difficulties of the advance of the column were greatly enhanced by the natural features of the country through which it had to pass; also, how the large proportion of unarmed carriers to fighting men—which necessarily existed—rendered the column vulnerable in a marked degree. This was accentuated by the narrowness of the route, which rarely permitted of more than one man, or at the outside two, to travel abreast.

It was little better than a well worn track, and in parts was much cut up and worn away by the raging torrents which sweep down the inclines during the rains.

There were many impediments, too, to quick progression. Huge trees continually lay across the road, causing gaps in the column, and necessitating continual halts for closing up. Thus the rate of marching exceeded seldom, if ever, a rate of 1 mile per hour. The transport of the guns, more especially the 7-pounders, also hampered the movements of the column. The state of the roads did not admit of their being dragged by hand; they had consequently to be carried piece-meal, each gun, its carriage, and the two wheels being carried separately. These pieces were severally carried, by relays of two carriers at a time, who carried them slung on bamboo cane.

The proportion of unarmed men to fighting men was as follows :—

- 100 Ibadans, or friendly natives, acting as scouts.
- 350 Gold Coast and Lagos Houssas.
- 42 2nd West India Regiment.
- 3 7-pr. M.L. guns.
- 2 3-barrel Nordenfelts.
- 1 Maxim Nordenfelt.

600 Carriers, 250 of which were required for the guns and ammunition.

100 for the carriage of drinking water.

80 for hospital.

The remainder being told off proportionately for Officers' baggage, West Indian Troops and ammunition reserve.

During the day any fears of not encountering opposition were quickly dispelled; as the Jebus did not evacuate their villages without first offering a stout resistance.

On the second day's march the enemy was met in force. They made a determined stand, fighting in high standing mealie fields, and under cover of a hollow road. A sharp fight took place, but at the end of three-quarters of an hour the enemy retired within the walls of an old fort, surrounded by a moat at least 30 ft. deep. The 7-prs. were then brought up, and shelled the place. This was too much for the Jebus, and they retired *pêle-mêle*.

The third day was uneventful; the whole country and all the villages were evacuated for miles. The campaign was thought to be over, and it seemed probable that the Jebus would continue to fly on the advance of the English.

This, however, was only the lull before their final effort. Nine miles to the south of Jebu Odi runs the Yimogyi River. This river is held in highest reverence by the Jebus. It is their great religious or fetish place. The fish are even sacred; and it is here that they offer their sacrifices and appease their gods. During the fourth day's advance, and about half a mile short of this river, the Jebus were met in force. The engagement commenced by the advanced troops being fired on out of the bush while in the act of crossing a shallow tributary of the above-mentioned river. The Maxim was brought up, and its fire, together with the advanced guard of Houssas, compelled the Jebus to retreat.

They continued to retreat until an open space, used as a market place, was reached. Here another stand was made, but the troops behaving coolly and firing well forced the enemy back, and they retired slowly, fighting all the way, on their position in rear of the river.

Along this river they took up a very formidable position. The path leading up to the stream led through a steep and narrow ravine, both sides of which were obscured to view by dense undergrowth. The far bank, on which the Jebus were posted, commanded the approach to the stream; also, owing to the dense background of undergrowth in their rear, their position and movements were completely obscured.

A little to the right of the track the stream made a bend, forming an angle re-entrant towards the enemy; thus the approach was virtually flanked, and that the column did not suffer more, here, during their advance, is simply due to the fact that they were sheltered by the intervening undergrowth and the shelter of the ravine.

The strength of the enemy, judging from the size and number of

huts in their camp at the village of Maybon, and also from the reports of prisoners, must have been between 7,000 and 8,000. They had not only occupied this position but they attacked the column in its entire length.

Buoyed up as they were by superstition, for three hours they made a most determined and resolute stand, sending to their front fresh relays of hundreds of men, whenever either losses or expenditure of ammunition required it; and fighting with a bravery engendered by ignorance and fanaticism combined.

For some time the position of the column was most critical. However, gradually a small contingent was pushed forward through the stream, which with some loss was enabled to reach the opposite bank; their advance being all the time covered by a hot fire from the near bank. The Maxim was also with great difficulty and loss to the gunners brought up, and at last reached the opposite bank. This small force having pushed through and broken the enemy's centre, as it were with a small wedge, reinforcements were enabled to be pushed up to their aid, but the progress was painfully slow, owing to the force being engaged along the entire line of advance.

The firing throughout, as in the generality of bush warfare, was of the wildest description. All the efforts to control the fire were of no avail; the sectional firing, which had been studiously practised, was totally forgotten, and the waste of ammunition was stupendous.

The Maxim throughout did good work, and certainly kept the enemy at bay. The 7-pounders and rocket tubes also kept up a continual blaze, and, doubtless, had a good moral effect.

The bush and undergrowth were so dense on all sides that it was impossible to note the effect of the fire; though afterwards it was found that the losses on the enemy's side were very great.

Meanwhile, though the column during this long and protracted attack had been almost stationary, they had clung on to their position gained on the further bank with the utmost tenacity; and at length the fire of the Jebus appeared to be abating. Now a speedy advance was made to where the country assumed a more open aspect, and within easy reach of where their vast camp was situated.

It was now seen that they had evacuated their camp, leaving their ammunition, provisions, &c., behind them, so precipitate had been their flight. The West Indians were kept in reserve by Colonel Scott during the action, to be used as a final stand-point should the occasion have demanded it.

The Houssas possess a reputation for bravery, second to none, on the coast; and, looking back on the two engagements, it must be acknowledged that this reputation was fully sustained, notwithstanding that in proximity to the river they appeared imbued with the ascendancy of the Jebu. Permeated as they are by superstition and fetish customs, every allowance must be made for them; but, nevertheless, their lack of drill, and more especially fire discipline, and the incapacity of their Officers to talk the Houssa language, all tend to detract from their value as a fighting machine.

The night after the battle was spent by the force in a state of mind far from jubilant. True, they had captured the Jebu camp, and the Jebus had taken to precipitate flight; but nothing was known, beyond conjecture, of the extent of their loss. There were also 11 miles still to be traversed before the capital was reached. It was questionable how the force would stand a repetition of the day's attack, and whether the ammunition, under a similar expenditure, would last out. However, on the morrow all fears and doubts were soon put at rest by emissaries arriving with conciliatory messages and flags of truce.

Jebu Odi, the capital, was entered without the exchange of a shot, and the King and all his retinue surrendered. The force remained in Jebu Odi for a fortnight, during which time the Governor of the colony enlightened the King on the resolutions of the Home Government. Flying columns were also sent out along the principal routes leading to the interior, to declare the roads open for trade.

Proofs of the horrors they had perpetrated, in the shape of human sacrifices, were found in all their fetish houses. The remnants of these were all carefully interred, and their fetish houses burned. The King also was informed that such practices would no longer be permitted.

When all was settled the force returned to Lagos, leaving a garrison of 100 Houssas and three European Officers in Jebu Odi. A large flying column also was sent to the westward by the Saargemu route. This column found that the lesson at the Yimogyi River had everywhere made itself felt, and that the chiefs of all the villages came in from far and wide, only too anxious to acquiesce in, and to further any proposals made by the Government of the great Queen.

Thus ended the campaign, the result of which may be said to have been eminently successful, and the cost of which was considerably under 10,000*l.*: a small sum in comparison to the big result obtained. This expenditure may be expected to be soon wiped off by the enormous increase of revenue which must accrue to the colony therefrom.

EXPERIMENTS AT SPANDAU ON 2ND APRIL, 1892, TO
ILLUSTRATE THE PENETRATION OF THE 1871-84
11 MM. (0·433-IN.), AND 1888 PATTERN, 8 MM. (0·315-IN.)
GERMAN RIFLES.

(From the "Deutsche Militär Artzliche Zeitschrift" of May, 1892.)

THIS course of experiments, which was conducted in presence of a large number of army surgeons, was undertaken at the instigation of the Surgeon-General of the Army.

The experiments were preceded by a lecture by Captain v. Heyking, of the School of Musketry, in which he described certain trials with the 1888 pattern rifle, in so far as they had reference to those about to be undertaken.

The introduction of the smaller calibre, simultaneously with the employment of a new means of propulsion in place of old black powder, had produced considerable increase in the velocity of the bullet, and consequently in its penetrating power. The increased penetration of the smaller calibre bullet, as well as its increased power of preserving its shape on penetration, had also been largely due to the steel coating (envelope).

Captain v. Heyking described how the introduction of this steel coating had been brought about, and how increased penetration had, at the same time, been somewhat accidentally obtained.

Experiments had shown that lead was too soft to take the necessary rifling of the bore, while, at the same time, the latter quickly became fouled.

Trials were made with bullets of various metals which, though harder than lead, were somewhat lighter specifically, such for instance as steel, copper, and brass. At short ranges these gave good results as regards accuracy and penetration, but they quickly lost their velocity. Better results were obtained from wolfram, which is twice as heavy as lead. It was found, however, that this metal could not be obtained in sufficient quantity, and, moreover, it was too dear.

Major Bode now hit upon the idea of using a lead bullet with a coating of a somewhat harder metal. The lead gave the bullet the necessary specific gravity, whilst the coating was to furnish the rotation required for stability. The coating was first made of nickel-plated copper, but this was not sufficiently durable, and a steel coating was tried.

These last bullets were found to be very durable, and, in addition to a low trajectory, had great accuracy and range, and lastly, what was quite unexpected, greatly increased penetration, due to the steel coating.

Whilst the 11 mm. (0·433 in.) lead bullet on striking the target

invariably sets up into a broad, generally mushroom-shaped, or hat-shaped, mass, the 7·9 mm. (0·311 in.) steel-coated bullet does not as a rule lose its shape, or, even if it does so, then very slightly, and, owing to its small diameter, loses relatively very little velocity and power in its passage through the object aimed at.

Captain v. Heyking gave several curious instances of the penetrating powers, &c., of this last bullet.

In the summer of 1891, whilst a company of Würtemberg troops were drilling in one of the barrack rooms, a rifle was accidentally discharged. The bullet passed through the body of one man, through the arm of a second, then through a cupboard, a bedstead, left its mark on the iron bedpost, and finally lodged in the wall.

The man who had been shot through the arm called out "I am hit"; the greater part of the men rushed to his assistance, a few searched for the bullet, while the remainder looked on, amongst the latter the man who had been shot through the body; he did not know that he had been wounded. It was not till after the lapse of several minutes that he cried out, "My God! how weak I feel."

It was only then noticed that he was bleeding freely from the wound of which he died two days later. The incident was related by one of the Officers of the regiment to which the man belonged.

With regard to the experiences of the recent Chilian War, Captain v. Heyking maintains, in spite of the assertion of a high Chilian Officer that the proportion of killed to wounded, as regards the small-bore Männlicher rifle, was as 4 to 1, that the reverse is the case. He referred to the testimony of an expert, whose report went the round of the papers, and in which the author states: "The principal advantages of the Männlicher were, great accuracy at short, medium, and long ranges, wonderful facility for acquiring its manipulation by the soldier, solidity and excellence in construction, its great influence on the 'morale' of the troops, and finally the small proportion of mortally wounded." The wounds caused by the Männlicher are of quite an exceptional nature; they either kill the man outright, or else ensure recovery free from complications or excessive suffering. The bones were clean pierced, even at the greatest distances, without leaving splinters of steel or lead, which usually cause such aggravation of the original wound. The bullets, after extraction, had retained their original shape.

In an engagement at Bandeng, in Africa, where only small-bore rifles were used, it was noticed that several of the blacks, who had been rolled over at a distance of from 200 to 250 m. (220 to 270 yds.), after a time rose, and, holding their hands to their sides or breast, crept away into the undergrowth out of the line of fire.

In the case of a soldier of the Colonial troops who was shot at musketry practice at a range of 250 m. (270 yds.), the bullet passing through the upper part of the upper arm and grazing the bone, the wound healed in eight days, without the formation of matter, under a simple sublimate treatment, and without using more than two cotton-wool compresses, smeared with vaseline, placed on the points of ingress and egress (which latter could scarcely be distinguished

from each other), and secured with a couple of turns of bandage; the compresses were at first changed twice a day, but, after four days, only once a day; the passage of the bullet closed already after four days.

On the 1st May, 1891, in the suppression of the labour riots at Fourmies, and in 1890 at Biala, where the distances were very short, the wounds inflicted were very severe, and for the most part mortal.

The experiments of Professor Bruns, who fired from the Belgian 7.65 mm. (0.301 in.) Mauser rifle, are very interesting. He found that the bullet, even after perforating the strongest bones of the human body, would pass through from four to five men at a range of 100 m. (110 yds.), three to four men at 400 m. (440 yds.), and from two to three men at 800 m. (880 yds.).

He also showed that at ranges above 300 to 400 m. (330 to 440 yds.) the small calibre bullet hardly sets up at all, while between 400 m. (440 yds.) and 1,500 m. (1,640 yds.) the bullet as a rule makes a wound with a very small passage, with very small apertures at the points of ingress and egress, and with very little shattering of the bones, or tearing away of the softer substance. These wounds almost all bear a subcutaneous character, and, since the bullet, or parts of it, seldom or never remain in the body, may be readily healed without the formation of matter. As most infantry battles will be fought between the ranges mentioned above, Professor Bruns has some justification in calling the small calibre rifle a most humane weapon.

The Austrian Army Surgeon, Dr. Habart, arrives at similar conclusions as to the humane character of the small-bore bullet, but is of opinion that infantry fights will often take place at ranges of from 1,200 to 1,800 m. (1,300 to 2,000 yds.). He divides his distances into zones, as follows:—

Up to 500 m. (550 yds.) the zone of “setting up” (explosive action).

500 to 1,200 m. (550 to 1,300 yds.) the zone of the “clean hole through.”

1,200 to 1,800 m. (1,300 to 2,000 yds.) the zone of “splitting up and tearing.”

1,800 to 2,600 m. (2,000 to 2,850 yds.) the spent bullet zone of “splitting up and tearing.”

Somewhat analogous results were obtained by Delorme and Chavasse, Professors at the Veterinary School at Paris, with the Lebel rifle.

The above results are, however, not altogether free from objection, since the results for the longer ranges were not obtained with service charges at these distances, but by so diminishing the powder charge as to get the remaining velocity that the bullet would have at the various ranges with the ordinary service charge. These diminished charges would obviously produce different effects, as regards rotation and rise of temperature, from those which would be produced by

ordinary service charges. The effect on dead bodies would also not be precisely the same as on living men.

It is worthy of note that Dr. Habart also collected statistics with regard to suicides and accidents. He describes how a shot which had come from a firing point 2,300 metres (2,500 yards) distance struck a soldier of the 23rd Rifles, passing through his skull and stony-bone (Felsenbein), that is to say, through the strongest bone of the human frame.

The result of the experiments, carried out partly with the 1871-84 and the 1888 rifles firing at two precisely similar targets, were as follows:—

	1871-84 Rifle. Bullet of tough- ened lead (70 per cent. lead, 15 per cent. antimony, 15 per cent. tin).	1888 Rifle. Bullet of tough- ened lead with nickel-plated steel coating (0.0354 in. thick, sides, 0.0158 in. thick).	Lebel Rifle. Bullet of toughened lead with nickel coating.
Calibre	11 mm. (0.433 in.)	7.9 mm. (0.311 in.)	8 mm. (0.314 in.)
Weight of bullet	25 gm. (385.8 gr.)	14.7 gm. (226.9 gr.)	15 gm. (231.5 gr.)
Powder charge	5 gm. (77.16 gr.)	2.75 gm. (42.44 gr.)	2.8 gm. (43.21 gr.)
Velocity of bullet 27 yds. (25 m. from muzzle).	435 m. (1,427 ft.)	620 m. (2,034 ft.)	630 m. (2,067 ft.)

Range 50 Metres (55 Yards).

1. Trunk of an oak 45 cm. (18 in.) diameter, bullet passed through.
2. Trunk of a fir-tree 52 cm. (20 in.) diameter, bullet passed through.
3. Four oak balks, each 22.5 cm. (9 in.) diameter, five bullets in the third oak balk.
4. Two oak bulks with bad cores, each 30 cm. (12 in.) diameter, bullet passed through.
5. Dung heap 1 m. (39 in.) thick, bullet passed through.
6. Peat soil 1 m. (39 in.) thick, bullet passed through, and did not lose its shape.
7. Layers of sods 1 m. (39 in.) thick, the bullet penetrated 19 in. (49 cm.).
8. Unsifted sand 1 m. (39 in.) thick, the bullet penetrated 28 in. (71 cm.), and did not lose its shape.
9. Sifted sand 1 m. (39 in.) thick:—

- (a) With the 1871-84 rifle the bullet penetrated 36 cm. (14 in.), and set up into a mushroom shape.
- (b) With the 1888 rifle the bullet penetrated 52 cm. (20 in.), and did not lose its shape.

10. Wall:—

- (a) One brick 25 cm. (9.84 in.); (b) Two brick 51 cm. (20 in.). With volleys from thirty rifles the walls were shot through—(a) at the first volley; (b) at the second volley.
- 11. Iron plate 6 mm. (0.236 in.) thick, bullet passed clean through. (Captain v. Heyking remarks that even an 8 mm. (0.315 in.) iron plate of Krupp's best construction is not absolutely safe against a rifle bullet.)
- 12. Boxes made of 25 mm. (1 in.) planks placed 0.25 metre (10 in.) apart and filled with sand, bullet passed through. A similar box, planks 0.20 metre (8 in.) apart, and filled with ordinary stones, the bullet did not pass through.
- 13. Closed box filled with dry saw-dust, the bullet from the 1888 rifle passed clean through.
- 14. Closed box filled with wet saw-dust, 1888 rifle used, the lid was forced off.
- 15. Closed box with boiled starch, 1888 rifle used, the box burst open.
- 16. Closed box with boiled starch, 1871-84 rifle used, box completely burst open.
- 17. Closed box with clay, 1888 rifle used, box burst open, the inlet and outlet holes in the wood small, the cover forced off, channel through the clay large, but tapering down towards the point of exit.
- 18. Closed box with clay, 1871-84 rifle used, box completely burst open.
- 19. An hermetically sealed tin box filled with water, 1888 rifle used, box burst open.
- 20. An hermetically sealed tin box filled with water, 1871-84 rifle used, box completely burst open.
- 21. Pig's bladder filled with water, 1888 rifle used, a grazing shot, the bladder was torn.
- 22. Pig's bladder filled with water, 1871-84 rifle used, the bladder was completely burst.
- 23. Open box with boiled starch, 1888 rifle used, the box burst.
- 24. Cube of moist clay of 230 mm. (9 in.) side, 1871-84 rifle, great bursting effect, especially after penetration, large opening where the bullet came out, 1888 rifle, holes of 6 cm. (2.36 in.) diameter.
- 25. A horse's head, skinned, but with the brains intact, 1888 rifle used, gaping wound at point of entry (explosive action).
- 26. A cow's head, brains removed, completely dry, rifle 1888, circular hole of 8 mm. (0.314 in.) diameter.
- 27. Lungs, suspended loosely, not blown out:—

- (a) 1871-84 rifle, fissure on entering 9 mm. (0·354 in.) wide and 18 mm. (0·709 in.) long; fissure on issuing 32 mm. (1·26 in.) wide, 48 mm. (1·89 in.) long.
- (b) 1888 rifle, fissure on entering 9 mm. (0·354 in.) wide and 12 mm. (0·472 in.) long; fissure on entering 10 mm. (0·394 in.) wide, 15 mm. (0·59 in.) long.

28. Hollow bones of the leg (tibia), fresh:—

- (a) 1871-88 rifle (diaphysen shot), complete bursting action two portions).
- (b) 1888 rifle, (a) (epiphysen shot), explosive action on entering; (b) the bullet struck on the epiphysen line, circular opening and splintering of the bone.

The far less explosive action of the new small-bore toughened lead bullet with an envelope was most apparent. A wish was expressed that these highly instructive experiments might be the first of a series, which would tend to bring the combatant and Medical Officers together in a mutual desire to arrive at the real effect of newly-discovered missiles upon the human frame.

NOTICES OF BOOKS.

Rulers of India. Lord William Bentinck. By DEMETRIUS BOULGER. Oxford: Clarendon Press, 1892. Pp. 214. Size $7\frac{3}{4}'' \times 5\frac{1}{4}'' \times \frac{3}{4}''$. Weight under 1 lb. Price 2s. 6d.

This is a record of a remarkable career. Born in 1774, Lord William entered the Coldstream Guards at the age of seventeen, became Captain in the 2nd Light Dragoons the following year, and at the age of twenty was Lieutenant-Colonel of the 24th Light Dragoons, and served in Flanders on the Staff of the Duke of York. As Military Attaché he accompanied the army of Marshal Suwarrow on its campaign in Northern Italy and Switzerland, and was present in the same capacity with the Austrian Army at the Battle of Marengo, 1800. Marrying in 1803, he was appointed that year, at the age of twenty-nine, Governor of Madras; but here the work was of a very harassing character, and the Mutiny of Vellore was the chief cause of its termination by his recall in 1807. Under seventeen years he had attained the rank of Major-General, and as such was employed in Spain under Sir H. Burrard, Sir J. Moore, and, as Lieutenant-General, under Sir A. Wellesley. His services in command of the British troops in Sicily, to which he was appointed in 1811, are within the recollection of most readers of the Peninsular War; but he was hardly a very successful military commander. In 1827 Lord William became Governor-General of India, in succession to Lord Amherst, and during his seven years tenure of office he effected great reforms, including the abolition of *Sati*, the destruction of the pest of Thags, and, moreover, inaugurated a new education policy. It was during his administration, also, that the difficult question of the renewal of the Company's Charter was settled in 1833. The book is well and interestingly written.

Navigation Astronomique Simplifiée. Par A. COLLET, Capitaine de Frégate, Répétiteur à l'École Polytechnique. Paris: Gauthier Villars et Fils. Pp. 24, with tables. Size $13'' \times 10'' \times \frac{1}{2}''$. Weight under 19 ozs. Price 8s.

Everyone concerned with the navigation of the rapid modern steamship can hardly fail to be impressed with the vital importance of a frequent determination of their ship's position as nearly as may be, or at least, if nearing the land, the bearing of some point thereon which it may be desirable to make without delay.

Under such circumstances, when both the latitude and the longitude are, at best, doubtful values, the well-known "Sumner's method" becomes one of the most practically useful problems of nautical astronomy.

Commander Collet, of the French Navy, who has already published some excellent works on the deviation of the compass, has, together with other of his countrymen, recognized this fact, and "Nautical Astronomy Simplified" is the result. The object of the book is to provide a method of obtaining the "Sumner lines," and thence the position of the ship, without logarithms, thus adding to the methods generally in use.

In order to obtain this result, the author employs Sir William Thomson's tables, from which, after a short calculation, the longitude and azimuth necessary to obtain the Sumner line may be obtained, without using the logarithms required for the ordinary longitude by chronometer and azimuth.

This work must be commended for the thoroughness with which it has been wrought out, and is well worthy of a careful examination by those interested in the subject of which it treats.



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LIEUTENANT-GENERAL E. H. CLIVE, Governor and Commandant Royal Military College, Sandhurst, Member of Council, in the Chair.

MAGAZINE RIFLES, THEIR LATEST DEVELOPMENTS AND EFFECTS.

By Captain WALTER H. JAMES, late R.E., F.R.G.S.

It is now some five years since I last had the honour of addressing an audience in this Institution on the question which forms the subject of my lecture to-day. At that time, 1887, the nations of Europe were only on the road towards adopting a magazine rifle armament for their armies, but at the present moment every Continental Army has adopted them, or is in the course of so doing. In some, as a tentative measure, the old rifles have been adapted to magazine fire, but in all the great Powers a small-bore rifle has been, or is now being, introduced. Germany has discarded the Mauser for a new weapon, Austria has gone over to the small-bore Mannlicher, France has the Lebel, Italy has adapted her old-fashioned Vetterli, but proposes to introduce shortly a small-bore rifle, and Russia, after some hesitation, has finally declared for a small-bore magazine rifle. These various changes are shown in Table A.

In the lecture to which I have alluded, I ventured to lay down certain propositions, viz.: that the magazine should be a central one, that the bolt would have a rectilinear motion, and that the calibre would be considerably reduced, lower than what was then considered admissible. Table B shows the principal dimensions and construction of the chief modern military magazine weapons, from which it will be seen that the central magazine obtains almost universally. The calibres have been considerably reduced, and the rectilinear action has been introduced in the Swiss and Austrian Armies. Here

I may say that the Mannlicher action is the only one which has stood the actual test of war, having been employed with great success in the late struggle in Chili.

Military opinion, therefore, appears to support the view I then took, although there has been as yet some hesitation in adopting the straight pull-back breech bolt.

Before comparing the merits of the various rifles, it would be well to lay down, in the form of propositions, the principles on which an ideal rifle should be constructed; these seem to me as follows:—

1. The bolt should have a rectilinear motion, because that enables the soldier to fire without taking the rifle from the shoulder.

2. The magazine should be central, and should hold ten or twelve cartridges.

3. The cartridges should be contained in a frame, or filler, so that they can be rapidly loaded into the magazine.

4. The cartridges should be easily taken from the holder for use in the weapon as a single loader.

5. There should be a cut-off, which should be so arranged as to facilitate the use of the weapon as a single loader.

6. The bore should be sufficiently small to enable a long bullet to be driven at a high velocity, so that at medium ranges, *i.e.*, within 800 yards, one sight will suffice for military purposes.

To all these points, except the first, I imagine a general consent will be given.

But the first seems to me very important also. For it enables the soldier to fire without taking the rifle from his shoulder, and this at very close ranges; when victory or defeat are trembling in the balance, every second gained is of importance.

The objection urged against this form of breech is that it is liable to open if the butt of the rifle be struck against the ground. This is true, although the objection seems to me of no moment, because the rifle cannot be fired when the breech is not locked.

The second proposition, so far as the position of the magazine is concerned, is, I think, universally admitted. But should the weapon only be used as a magazine weapon, as in the Austrian and German weapons, or as a magazine and single loader, as in the English and Swiss weapons? The latter seems to me the best, because it ensures more certainly the magazine reserve fire at the required moment, and because, the magazine being cut off, there is less chance of ammunition being wasted. The objections to it are:—

1. The increased weight of the rifle owing to the full magazine always carried about.

2. The fact that the soldier may not use his magazine at the critical moment, whereas with the systems which always fire from the magazine he can, when desired to increase the rapidity of fire, without having to go through any special motion to open the magazine. Opinions may differ as to the number of cartridges the magazine should hold. We have ten, the Swiss twelve; but, whatever number be decided on, it is very important that it should be possible to load the magazine quickly. This involves the use of some

form of frame or filler. I have here those used by the Austrians, Fig. 1, the Germans, Fig. 2, the Swiss, Fig. 3, and the Belgians, Fig. 4. Personally, I think the last far the best, because it does not go into the magazine and is the lightest. Moreover, its use allows a closed magazine, whereas the others must have a hole for the cartridge-frame to fall through.

The frame should allow the cartridges to be easily taken from it as a single loader, and should allow insertion either way. The only objection to packing the ammunition in frames is the additional weight to be carried; this is so small and the advantage gained so great that it may be neglected.

If you adopt my view with regard to the magazine, proposition 5 follows as a matter of course: a cut-off must be supplied, and this, I think, should take the form adopted by us, *i.e.*, a metal slide on which the cartridge rests when used as a single loader. This is better than letting the cartridge rest on the top of the magazine cartridges or on the top of the elevator, which is only supported by a spring.

And now as to the bore. This should be as small as possible compatible with sufficient stopping power in the bullet. Assuming the weight required for this purpose to be about 200 grs., the smaller the diameter the greater will be the capacity for the bullet to overcome the resistance of the air. You will see from Table B that most of the weapons now in use have a bore of about 0.3 inch. But the new Italian gun is 0.256, and many consider this a better size. Probably we shall see in the near future a rifle bore of not more than a quarter of an inch, although this would, of course, involve very long bullets, with all their inherent difficulties.

Mieg, the well-known German authority on rifles, has, however, suggested the use of the heavy metal wolfram, specific gravity 18, *i.e.*, nearly double that of lead, so as to obtain the required weight with a less length of projectile. General Wille has advocated the view put forward by his compatriot, in a work entitled "Wolffram Geschosse," which is well worthy of attention. The adoption of this metal would diminish the length of the projectiles by one-half, and thus avoid the defect of a very severe twist in the rifling.

Looking at Table B you will see that these modern weapons have a muzzle velocity varying from 1,968 to 2,336 ft.

I may state that the Swiss bullet in a 6.5-mm. rifle has attained a velocity of 700 m. at 25 m. from the muzzle of the rifle, *i.e.*, a muzzle velocity of about 2,400 ft.

Probably, as time goes on, we shall get still higher velocities, and we may look in the immediate future for 2,500 or 2,600 ft. muzzle velocity, or even higher,¹ *i.e.*, we shall see the rifles which will require for practical purposes but one sight up to 800 or 900 yards. These results may be obtained by further diminution in the calibre, which, while increasing the power of overcoming the resistance of the air,

¹ With a Hotchkiss Q.F. gun of 80 calibres over 3,000 ft. muzzle velocity have been obtained. A rifle is more than 100 calibres long, and there is, therefore, ample space to burn powder to produce the same velocity.

will still render possible the use of comparatively light bullets which can be fired by large charges without too great recoil.

All the bullets of the rifles in Table B have a hard metallic covering, except the Swiss, which has only a metallic covering at the point. You will remember that this casing was introduced to avoid the leading of the grooves and stripping of the projectile which occurred with long narrow lead bullets fired with high velocities. The Swiss certainly seem to have solved the problem of the paper cover, at any rate with the muzzle velocity they use, and I should imagine it would be worth while for us to experiment in the same direction, although recent experiments would seem to show that nickel iron is, on the whole, the best covering material, being sufficiently soft not to injure the barrel and not liable to rust, while it is much cheaper than copper. With regard to the shape of the cartridge, ours is, I think, far the best, as, owing to its coned shape, it is much less likely to jam than any of the others. The cartridges of Germany, Austria, and Belgium have a groove at the end instead of the ordinary base. The advantage of this is that the cartridge is packed more easily, and appears worthy of adoption.

The nature of the covering is shown in Table B. In savage warfare, no doubt, stopping effect is a great desideratum. This would appear to be better obtained by the Swiss form of bullet, Fig. 5, which has the advantage of costing less than the completely covered projectile. The effect thus produced is shown in the photographs I have here. Bound up with the question of bullet covering is that of high velocities. As we know from experience, in this country there is a tendency with the new bullets to blow through their covers, as did the Minié base cup through the Minié bullet. This difficulty has we know been overcome for velocities now used, but still exists where much higher ones are employed. The bullet I have here is designed to avoid this. It is a very simple expedient; the cup is put round the other way (see Fig 6). With this alteration there can be no danger of the core coming through the covering. The effect of this bullet is enormous, as you will see from this iron plate. The bullet sets up, and its stopping power must be enormous. Of course it loses somewhat in penetration, but if this be sought after it can be obtained by putting a front cover on over the base one as shown in Fig. 7.

Rifles fired with high velocities heat so rapidly that some protection must be afforded to the soldier's left hand, or he cannot hold his weapon. This protection has been sought in the German rifle and French carbine by means of an outer steel tube. I doubt if this be so efficacious as our own wooden hand-grip. The Swiss have extended the wood almost to the muzzle.

Having now gone through the various points I have laid down, let me briefly discuss the various weapons which now form the armament of the different European Powers. These are :—

German rifle.

Belgian „ Fig. 8.

Austrian „

Austrian carbine. Fig. 9.

Swiss rifle. Fig. 10.

French carbine.

English rifle.

In addition to which I shall draw your attention to the 0.256 inch Mauser, described in Table B.

The German rifle is well known, as it has been previously exhibited in this Institution.

The Belgian Mauser is an improvement on it; the bolt is strengthened: made simpler so as to be easily taken to pieces, while the frame is cheaper and lighter, and falls out when the cartridges are inserted in the magazine, which thus forms a closed box.

The Austrian rifle differs in no way from that which I showed some years ago in this Institution; the carbine has an improved form of straight pull-back (Fig. 10).

This appears to me to be a considerable improvement on the original Mannlicher bolt; the cartridge frame is the same as that used in the rifle; its rhomboid form is not so good as the rectilineal one of the Germans, which is in itself surpassed by the light frame of the Belgian.

The Swiss rifle presents many peculiarities; it has an excellent bolt system, straight pull-back, which is very carefully thought out in all its details, the only objection to it being that it is somewhat long, and, therefore, heavy. This, I think, could be modified, and certainly the bolt action is one of the best now in existence.

The French carbine has the Berthier bolt, the great feature of which is the fact that it contains no screws, and can be taken to pieces with the greatest ease by the soldier himself. It distinctly stands in the first rank of breech actions.

The English rifle you all know. The objections to it appear to me to be as follows:—Its bolt is extremely complicated, compared with the Berthier or Belgian Mauser bolt. These contain far fewer parts, and must, therefore, be the cheapest to manufacture. From the "American Year's Naval Progress" for 1891, I extract from p. 165 the following opinion on the relative merits of the Belgian Mauser and the Lee-Metford:—

"Its advantages over the English rifle are too manifest to require comment."

So long as we maintain the same cartridge, there is no need for uniformity of bolt actions in the Service, and I, for one, should certainly advocate the abandonment of the Lee bolt for one of a more modern, less complicated, and less expensive nature.

The English magazine must be loaded by single cartridges, as these are not contained in frames. The objection to this system is that when once the magazine is empty it takes too long to refill, and possibly, therefore, at the moment of great need, just when the magazine was most wanted, the soldier would only be able to use the rifle as a single loader, while he would most certainly be opposed in Europe by a frame-filled weapon. Surely we ought without delay to adopt a similar system for our Army!

Lastly, I would draw your attention to the .256-in. (6.5-mm.) Mauser, which is practically the same, so far as breech action is concerned, as the other rifles manufactured by Messrs. Loewe. But you will notice that the muzzle velocity is the highest in Table B, and its penetration, Table C, very great, while the greater lightness of the ammunition would allow a larger number of rounds to be carried.

With regard to the effects of the modern military rifle, we must regard them from two different aspects:—

1. Those produced on troop formations by the wide range of the bullets and flatness of their trajectory, and their larger number of bullets fired.

2. The physical effects of the bullets on the human frame.

Dealing with these facts *seriatim*, it is evident that in the first case we shall find much deeper zones in which bullets will take effect, *i.e.*, that the probability is a larger number of men may be hit, and this is intensified by the fact that using the ordinary standing sight, there is a shot-swept zone of at least 700 yards, that is to say, for all practical purposes one sight only is required up to this distance. The French say that in action up to 600 m., *i.e.*, 660 yards, the 400-m. sight suffices. Our regulation is to employ the “fixed” sight within 500 yards, aiming at the feet. The German soldier goes into action with 150 rounds in his pouch, the French with 112, the Austrians 100, an increase in number over what was formerly carried, and which will certainly be used by the soldier under fire. In addition to which the immediate reserves are greater. Now, owing to ricochets and the dispersion of fire due to irregularities in shooting, a considerable space beyond the real range, probably 100 yards or greater, will be more or less swept by bullets. From this it evidently follows the front line and supports alike will be struck by fire aimed at the former. This will render it more difficult than ever to feed the shooting line, more difficult than ever to keep supports and reserves in hand, as they will suffer from the rapid fire aimed at the front formations. The use of guns which, employing curved fire, can remain longer in action than flat trajectory weapons, and thus keep the defenders under a powerful fire until the attacking troops are fairly close, seems a plain necessity, while some Continental authorities seem to think that the best formation for supports will be to advance in small sections from a flank, thus offering but very little lateral target to the enemy.

We have to consider in addition to the flat trajectory the effect of smokeless powder, or rather of powder which gives but little smoke. This is to the advantage of the defensive, inasmuch as the shooting will be no longer obscured by smoke, while the advantages of cover will remain the same. Moreover the position taken up will not be betrayed by the smoke coming from the rifles.¹ On the other hand, the offensive loses the shelter given by the smoke cloud, and thus the defenders of a position can better judge ranges,

¹ Guns will not be so much affected, for the brilliant flash is no longer obscured by smoke, and when the ground is dry the dust driven up by the explosion of the charge will show their station.

and pour in at close quarters a more than usually deadly fire. This points definitely in one direction, viz., to an increased necessity for preparation by artillery fire. This will be obtained in two ways, the one, in the case of deliberate battles by the guns taking up a position under cover of darkness, or by long-range indirect fire from guns the position of which is no longer revealed by their smoke, the other by an increased endowment of guns to the Army Corps. It is a curious fact that at a time when all the nations of Europe have increased the proportion of the artillery to the other arms, we in England have reduced it. The English Army Corps, presumably intended for service on the Continent, is no doubt chiefly a matter of academic interest, but, it is nevertheless remarkable that while France and Germany have increased the number of guns to nearly 5 per 1,000 we have reduced them to about $3\frac{1}{2}$. I presume that in course of time our extremely useless common shell will be replaced by some more efficient projectile, either one with a high explosive bursting charge or some improved method of fragmentation, such as the Austrian ring shell.¹

The difficulties of observation due to long-range weapons will have a tendency to prolong deliberate battles, because of the caution needed before the assailant will commit himself to a definite line of action. He will as it were have to conduct a reconnaissance in force before entering on his main action.

There is another point to be borne in mind, the much-vexed question as to whether the soldier is to fire when advancing or not. Experiments have been conducted in France which seem to show that fair effects can be got provided the rifle is properly arranged for the purpose. If this be the case it is plain that the difficulty of passing over the last 200 yards of the attack is considerably lessened.

As to the effect of modern weapons on cavalry action on the battlefield, I feel some diffidence in opposing the general view that it may still do great things. This teaching seems to me largely due to peace practice, where no bullets are in the rifles. When the ground is favourable, and surprise more or less possible, no doubt cavalry may still be used, but under ordinary conditions to imagine that men and horses can live through a shot-swept zone of a thousand yards seems to me almost ridiculous. The magnificent spectacle of line after line of horsemen sweeping over the field is beautiful at autumn manœuvres; in war the physical obstacle formed by the falling men and horses would alone suffice to break up all formation if they did not altogether stop the advance.

The physical effects of the new bullets must also be considered. They have formed the subject of considerable experiment on the Continent, and I believe in England, although I can give you none of the English results, which are regarded as highly secret and confidential. I append to the end of this lecture (Table D) a list of foreign works which may be with advantage consulted on the subject. It seems to me that the position is somewhat as follows. The effect of bullets on the human body depends—

¹ This has been done with the 7-pr. jointed gun.

1. On the size of their transverse section.
2. On their velocity, *i.e.*, power of penetration.
3. On the amount of setting up undergone by the bullet after entry.

Plainly, the bigger the bullet the more damage it is likely to do, *i.e.*, the bigger the bore the greater the wound.

The setting up of a bullet acts in a similar way, as exemplified by an express rifle. Now, most of the modern bullets with their hard coverings do not set up much, unless at close ranges. Hence there is a tendency for wounds in the soft tissues, except when the express effect of the bullets takes place, to be cleaner and less dangerous. On the other hand, the high velocity will drive a bullet farther, and hence it may penetrate several men, as was shown in the late suicide in the Vienna Barracks; and where the new bullet strikes a bone, at close ranges, extensive splintering takes place, more so than with the lower velocity bullets, although these may be a bigger bore.

The small-bore bullet, if it penetrate the cavity of the chest or the abdomen, may be as dangerous as the big.

Dr. Enrique Deformes, of the Chilian Hospital of San Juan de Dios, has published in the "New York Herald" the result of his experience of the effect of the Mannlicher bullets in the Chilian War. He sums up as follows:—The flesh wounds caused may in a large percentage be classed as in nowise serious and easily curable with proper care, unless in grave cases of hæmorrhage of an artery or vein or peritonitis. Similar conditions prevail in cases of fracture of the smaller bones. The fractures of the larger bones are larger in size than those inflicted by other projectiles, but so long as proper antiseptic means are employed they are of easier treatment. These results are, Dr. Deformes believes, due to the composition and construction of the Mannlicher bullet.

Dr. von Bardeleben, a Surgeon-General, and one of the leading doctors of the Prussian Army, bears out in general the deductions of Dr. Deformes. His views are as follows:—

In a modern battle the number of wounded and also the number of immediate deaths will be larger than formerly. But, on the other hand, the proportion of recoveries among the wounded removed from the battle-field will be greater, because the extensive splintering of bones will less often occur, and because the track of the bullet, being smaller and cleaner, will be less liable to septic influences. Moreover, a larger proportion of the wounded than heretofore will require only slight treatment, and bullets will not so often be found remaining in the body, and thus on the whole the surgeon may look for a favourable field for the display of his ability.

Penetration of the Projectiles.

This has of course enormously increased, the increase being due to the high velocity and to the fact that the hard covering prevents the projectile from being deformed. Table C shows the penetration of

some of the modern bullets. An iron plate nearly $\frac{1}{2}$ -inch thick was penetrated by the Swiss bullet at 10 m.

To sum up, it seems to me that considering the experience we have now gained we might pause before finally adopting the Lee-Metford rifle. It possesses an action needlessly complicated and costly to manufacture. The Mauser, Berthier, and Mannlicher bolts are superior and cheaper. If the barrel be maintained, although I should prefer a smaller bore, then the muzzle velocity must be raised as high as possible without undue strain or increasing too much the recoil. The cartridges should certainly be packed in frames. With these modifications we should possess a high-class weapon equal to any now being adopted by other countries, although I cannot help seeing we should do wisely to at once adopt the minimum calibre.

TABLE A.

Present Infantry Armament of European Armies.

Country.	Magazine.	Single-fire.	New small-bore.	Old large-bore adapted.
Austria	Yes.	..	Yes.	
Belgium	Yes.	..	Yes.	
Bulgaria	Yes.	..	Yes.	
England	Yes.	..	Yes.	
France	Yes.	..	Yes.	
Germany	Yes.	.	Yes.	
Italy ¹	Yes.	..	..	Yes.
Roumania ² .....	..	Yes.	..	
Russia ¹ .....	..	Yes.	..	
Servia ² .....	..	Yes.	..	
Switzerland	Yes.	..	Yes.	
Turkey	Yes.	..	Yes.	

¹ Has just chosen a new pattern (see Table B).

² New pattern small-bore under discussion.

TABLE B.—The Latest Patterns Magazine Rifles.

Country.	Weight.	Calibre.	Weight of bullet.	Bullet covering.	Muzzle velocity.	Sighted to	Position of magazines.	Rounds in magazines.	Cartridges in frames.	Cut-off to magazines.	Bolt action.	
Austria	lbs. ozs. 9 10	in. .315	grs. 242	Steel	feet. 1,968	paces. 2,500	Central	5	Yes	No	Straight	
Belgium	8 2	.301	219	Nickel.	1,980	metres. 2,050	"	5	Yes	No	Turns	
England	9 4	.303	215	Alloy of nickel and copper	2,000	yards. 2,900	"	10	No	Yes	"	
France	9 4	.315	216	Maillechort ¹	2,073	metres. 2,000	Tube	8	No	Yes	"	¹ An alloy of copper, nickel, and zinc
Germany	8 6	.311	223	Steel ²	2,034	2,050	Central	5	Yes	No	"	² Plated with an alloy of copper and nickel.
Italy	8 4	.256	..	..	..	..	"	5	Yes	No	"	
Russia	9 8	.300	215	Nickel	2,000	..	"	5	Yes	No	"	
Switzerland	9 10	.295	211	Steel ³	..	2,000	"	12	Yes	Yes	Straight	³ Plated with an alloy of copper and nickel.
Mauuser	8 6	.256	155	Iron	2,336	2,000	"	5	Yes	No	Turns	
Carbines.												
Paces.												
Austria .....	..	.315	242	Steel	..	2,400	Central	5	Yes	No	Straight	
France .....	..	.315	216	Maillechort.	..	..	"	3	Yes	No	Turns	

TABLE C.

Showing the Penetration of Modern Rifle Bullets into various Substances.

Range.	Rifle.	Materials.				
		Earth.	Deal.	Oak.	Iron.	Steel.
		ins.	ins.	ins.	in.	in.
10 m. (11 yds.) ...	French.	10	36	8	0·47	0·39
200 m. (220 yds.) ..	„	18	24	11	0·24	0·16
500 m. (550 yds.) ..	„	16	20	6	0·16	0·08
100 m. (110 yds.) ..	German.	36	32	..	Up to 300 m. (330 yds.) traverses 0·28 in.	
400 m. (440 yds.) ..	„	20	18			
800 m. (880 yds.) ..	„	14	10			

With the English rifle the following thicknesses are considered proof at any range :—
Earth, 24 ins.; iron or steel plate, 0·365 in.; fir, 38 ins.; oak, 24 ins.; one “header” or two “stretcher” sandbags.
The ·256 rifle given in Table B penetrated thirty 1-in. elm boards ½ in. apart at 40 yards, the bullet not suffering deformation.

TABLE D.

Foreign Surgical Works dealing with the effects of the New Small-bore Rifles.

Josef Bogdanik, “Die Geschosswirkung der Mannlicher Gewehre” in the “Wiener Klinik,” 1890, Part 12, pp. 308–336; and in “Der Militärarzt,” 1891, pp. 22 and 23.
Paul Bruns, “Die Geschosswirkung der neuen Kleinkaliber-Gewehre. Ein Beitrag zur Beurtheilung der Schusswunden in künftigen Kriegen.”
Delorme et Chavasse, “Étude comparative des effets produits par les balles du fusil Gras de 11 mm. et du fusil Lebel de 8 mm.”—“Archives de médecine et de pharmacie militaires.” 1891. Pp. 81–112.
Johann Habart, “Die Geschossfrage der Gegenwart und ihre Wechselbeziehungen zur Kriegschirurgie.”
Zuneshaburo Kikuzi, “Untersuchungen über die physikalische Wirkung der Kleingewehr-Projectile, mit besonderer Berücksichtigung des Kaiserlich Japanischen Ordonnanzgewehrs System Murata.”
A. Koehler, “Bericht über die chirurgische Klinik,” &c., in the “Charité-Annalen, XIV.” Jahrgang (1889), p. 574.
A. Koehler, “Historische Untersuchungen über das Einheilen und Wandern von Gewehr kugeln.”
Ernst Reger, “Die Gewehr schusswunden der Neuzeit.”
Ernst Reger, “Die Anforderungen der Humanität an die Kleingewehr-projectile. Deutsche militärärztliche Zeitschrift.” 1884. Part 12, p. 575.
Ernst Reger, “Neue Beobachtungen über Gewehr schusswunden. Deutsche militärärztliche Zeitschrift.” 1887. Part 4, p. 151.

O. Schickert, "Zur conservirenden Behandlung der Schussverletzungen des Kniegelenks."

Victor Wagner, "Ueber die Indicationen zu operativen Eingriffen bei der Behandlung von Schussverletzungen in der ersten und zweiten Linie."

Zwicke, "Bericht über die chirurgische Klinik des Prof. Dr. Bardleben pro 1880," in the "Charité-Annalen," VII year (1882), p. 560.

Lieutenant J. W. HEATH: I should like to ask Captain James if the velocities given are with the old powder or with the smokeless powder, or cordite.

Captain JAMES: Smokeless powder, all of them.

Major PALLISER: I wish, Sir, to say a few words on this subject in justice to Mr. Lee, a friend of mine, who is in bad health in America. The rifles which we see with the magazines, in the position in which he was the first to place them, are all more or less copies of the Lee Magazine Rifle now adopted in the British Service; and I may go further and say that the infringement of his patent is admitted abroad, a very important point, showing that Mr. Lee was the first to introduce the magazine in the position in front of the trigger bar. He always advocated that the magazine should be detachable, and I think that the Small-Arms Committee took that view, for our magazine is detachable. The Committee did not recommend that it should be used as a detachable magazine, for experience only must tell whether it is advisable or not to use that system. With regard to cavalry, I think the detachable magazine will be of the greatest service. Of course the mounted soldier can carry these magazines on the pouch belt, and he can also carry a great many more cartridges than the infantry soldier can carry; moreover, he can move at a very rapid pace. I maintain, therefore, that each individual cavalry man will become a sort of human machine-gun, able to move at the rate of 15 miles an hour on a pinch; and, therefore, 50, 60, or 100 cavalry soldiers thus armed will become formidable in our small wars;¹ hence these detachable magazines, being very strong and not likely to get out of order, will prove more valuable than the "filler." If my friend, Captain James, had been on a rough and tumble campaign, as very probably he has been, where the transport is inferior, he would probably decide that these "fillers" would get distorted. They are too rickety. It is all very well in Austria, France, and Germany, where they have fine roads, plenty of wagons and railways to carry ammunition in that form, but I venture to say, when I was on the campaign in Canada six years ago—very rough and tumble work—that all these "fillers" would have been out of shape in the first ten days. They could not stand a month's rough work such as we had. I think, therefore, they are utterly unsuited for our warfare, which is altogether different from Continental warfare. I consider the strong magazine that the Committee has adopted is the best for the purpose. It carries ten cartridges, and, on a pinch, the soldier can carry a spare magazine, and, with that spare magazine, there is no necessity for the "filler." The question appears to be, can that spare magazine be rapidly used? I tried it, by permission of the Officer Commanding the 10th Hussars, and found that Sergeant Beckwith could move at a gallop 150 yards, during which he took the detachable magazine out of its pouch and loaded his carbine without the slightest difficulty. Therefore the detachable magazine, in case the Commanding Officers

¹ Major-General T. B. Strange, late R.A., who commanded the Alberta Field Force in 1885, will, I believe, confirm my statement as one of his Staff Officers, that the greater part of the fighting he had to attend to was done by his cavalry armed with magazine rifles: and that, though they were only 100 strong, their armament of magazine rifles, which they knew perfectly how to handle, appeared to give each individual remarkable confidence. In such work as they were engaged in the *arme blanche* would have been useless. For the majority of combats our cavalry have to maintain, I recommend, therefore, a good magazine rifle with spare magazines, and certainly no rickety "fillers." In fact the rifle selected by the Small-Arms Committee would appear to fulfil all conditions.

desire them, would be an advantage. It is evident that a soldier could load his carbine much more rapidly at the gallop by means of the detachable magazine than by trying to stick one of these "fillers" into the empty magazine. It would be a very important and useful experiment to try. Nothing could be easier. All that is necessary is to give the soldier a carbine with the detachable magazine, and a carbine with the "fillers," and then see how he would get those "fillers" in at a gallop.

Major-General KEITH FRASER, C.M.G.: I have hardly any right to speak on this subject, being a cavalry soldier, but having had a great deal to do with magazine rifles, with the Mannlicher, the Schouloff, and other Austrian rifles, I venture to say a few words. One thing I should like to know is the number of cartridges which it is advisable to have for the magazine. In England we have ten—a large number. In France they have at present eight; but I understand Captain James to say that they are thinking of reducing that number to four. The Swiss have a very large number, I believe twelve. I remember, some years ago, Mr. Mannlicher telling me five was the outside he would trust in a magazine, for he thought that a man after he had fired five rounds would probably lose his head and not know how many he had to fire. A man might, perhaps, just keep count for the five, but he would lose count after that. I have had Austrian inventors showing me their rifles, and I have seen an Austrian inventor lose his head when firing his own rifle even, and forget the number of rounds. The result was, he threw out loaded cartridges, put in new packets, and sometimes fired more away after the magazine was empty. I should like to know what the opinion of infantry Officers is as to whether five, ten, or twelve is the best number for a magazine rifle. The lecturer has spoken with regard to cavalry. He appears to think that cavalry on a battle-field are useless, that their day has gone by. We are few in number certainly in England, therefore our opinion is not often expressed nor much attention paid to it, but we have one or two great men on our side who think that the day of cavalry has not gone by. Moltke was, perhaps, the greatest authority in Europe, and he has said that the rapidity of fire at the present day, and the great losses on the battle-fields will give cavalry, owing to its rapidity of movement, immense advantages that it never had before. They will be able to move from under fire, and it will be difficult to keep their range, whereas when infantry come into the zone of fire it is not easy for them to get out of it. Cavalry can come from the horizon, from "hull down," as it has been said, in a few minutes, and can sweep down upon the infantry. I do not say that any cavalry Officer would be insane enough to charge infantry that was not broken, or to charge them in front on level ground to be shot down all the way; but as long as there is dust and smoke, and rain, and mist, and undulating ground, it will be quite possible for cavalry on the battle-field to reach infantry, and, perhaps, in fogs, or in the dark in the evening to come down upon its flank. I therefore think that the days of cavalry in the battle-field are *not* over. We know what Hannibal did with his cavalry; we know that in the time of Napoleon weapons and projectiles had greatly improved, and yet it was the old story. It was the same thing at Custozza, where we saw three sections of a squadron of cavalry defeat an enormous mass of infantry and cause the winning of the battle. Armies are not *always* composed of philosophers. Dr. Johnson says, if an army were composed of philosophers there would be no possibility of panic; but with these awful weapons which are going to kill nearly everybody, I do not think that the few remaining would feel absolutely safe if they saw an enormous line of cavalry coming down on their flank at a critical moment. I think that there is still a chance for us. I do not wish to see cavalry men made into machine-guns as has been suggested, but I think at the same time the repeating carbine is more necessary for cavalry than ever. If we take a place we ought to be able to hold it, and to assist in that operation I think that long-range carbines with magazine rifles are, perhaps, more necessary than ever they were, and with their help we shall do very well in the future.

Captain EGERTON, Seaforth Highlanders: There is one point that has always struck me as having been somewhat exaggerated, and that is the necessity of employing either a somewhat heavier bullet, or one that, as the lecturer says, "sets up" a little more on striking the human body. My

opinion is the average human being, whether a European or not, does not require more than one bullet as a rule to stop him; certainly, speaking from my own personal experience, I do not believe that the average European, at least, ever wants more than one. There are exceptions, no doubt, but if he gets one he has had enough for that day. There is another point—I do not know whether it rightly comes into this lecture or not—which I consider very important, that is, the question of the particular nature of the troops which are in the future to be able to enjoy practice with the weapon that the lecturer has described, which will possess such an enormous amount of initial velocity, and therefore I presume a greatly increased range of fire. I do not allude so much to the Regular troops, or to the Militia, but I speak as regards the Volunteers. In the district in which I have the honour to be the Inspector of Musketry, there are some 383 ranges, and a comparatively small minority of these will, I fear, be safe for this rifle. In the case of the other ranges which are not safe, what is to happen to the Volunteers who are using them? I do not allude so much to the town corps, which can go away by train, as in London and Glasgow, but I refer to the small and scattered country companies. The result will be that a large number of ranges will disappear, and I regret to say that I am confident that with the ranges the Volunteers will disappear also. I consider that this is going to be one of the most important and serious facts that the country will have to face, and unless something is done, I really do not see how we are to avoid a large diminution in the numbers of the Volunteer force in this country, owing to the introduction of this rifle. I have alluded to this particular matter elsewhere, in a paper I recently read before the East of Scotland Tactical Society, but I venture to bring it forward again, as I think it is a point worthy, perhaps, of a wider circulation.

Colonel MALCOLM GREEN: There is one small question I should like to ask Captain James with reference to that sketch on the blackboard. Is the casing in which the bullet is placed supposed to accompany a bullet to the end of the range, or to leave it?

Captain JAMES: It accompanies it to the end. I have drawn it apart from the bullet so that you may clearly understand how it is put over the bullet. As a practical fact, the bullet is solid in its case.

Colonel NOLAN, M.P.: May I ask Captain James a question? He said he hopes that the new rifle will have a very high velocity, "so that at medium ranges, that is within 800 yards, one sight would suffice for military purposes." If you fire with a rifle sighted for 800 yards, even if gifted with a very high velocity, the bullet must fall 16 feet in 800 yards; if you fire with the same sight at 400 yards, the line of sight will be 8 feet above the object, and the bullet would fall only 4 feet. It must therefore go 4 feet over the point you aim at when you employ a sight fixed at 800 yards for a range of 400 yards. You may compromise by using a sight fixed for 600 yards, but then your bullet will go 2 feet over at 400, and 3 feet under at 800 yards. A variation of 2 or 3 feet would not matter so much when firing at a man standing up, but how are you to meet the case of a man lying down? It seems to me, if you use only one sight, from 100 to 800 yards, your good shot at 400 yards will be going 2 or 3 feet wrong when aiming at a man lying down, and the better the shot the greater will be the evil. If a man were standing straight up you might not miss, but if he is lying down you will very often. It seems to me that those who hanker after a solitary fixed sight are always only considering men standing up, and they never seem to consider the question of firing on a man either fighting under cover or lying down.

Lieutenant T. W. HEATH, Supply Officer, North London Volunteer Brigade: I should like to ask Captain James if he has the latest improvement of the sights of the magazine rifle. I have the honour of representing the South London Rifle Club. A fortnight ago we had a match against the School of Musketry at Hythe, and we were very handsomely beaten, we shooting with the Martini, and they had the magazine rifle with improved sights. I think the sight invented by, I believe, Mr. Rigby, was a very good form of sight in one way, but a bad form in a soldier's point of view. The square hollow backsight has a square block foresight, which must be brought in line with the object, and it takes some considerable time to align them. It takes a long time to align this sight. I tried it personally several

times, and from practical experience, as an old rifle shot, I found that when once you got the alignment, you could get very good shooting, but the time it takes to align it is a defect, especially for rapid firing. It is very well for the military breech-loader with which I shoot at Bisley. With a military rifle it is necessary to have a form of sight, which I am pleased to see has been improved on by the Hythe School of Musketry by filing the old backsight down and barleycorn foresight, so that you take the sight exactly the same as with the Martini. They made very good shooting. I was pleased to see that, because in a match of that kind against the picked shots of the Senior Rifle Club in England, it shows that the improvements have made the rifle better than the I, II, and III Marks. I believe that was Mark IV, but I understand they have given it the name of Mark I. I suppose the authorities do not like to admit so many Marks in the rifle after being passed by experts. I know that was the opinion of the authorities that it should be called Mark I. I am very glad of that alteration, because it has improved the rifle immensely. I had the honour some few years ago of being selected by the National Rifle Association at Wimbledon to fire the first magazine rifle made. The detachable magazine held five cartridges, and the very thing occurred to me that has been mentioned. I was firing at 200 yards to see what I could do in one minute. I fired twenty-five rounds, and then the very same thing occurred to me. I snapped off the rifle six times and had not a cartridge. Of course any hitch that way is liable to upset one and throw you off. I mention this to corroborate what has been said by General Keith Fraser. Having fired the first magazine rifle made, I thought he would like to hear that his statement was corroborated by my own actual practice at Wimbledon.

The CHAIRMAN (Lieutenant-General Clive): Gentlemen, I am sorry that absence on duty has prevented Colonel Slade from taking the chair. Colonel Slade is Commandant, School of Musketry at Hythe, and is thoroughly conversant with rifles and their projectiles, and his opinion would have been very instructive. My only qualification to replace him is that during my service I have fired with no less than six different weapons. I began with "Brown Bess" in 1855, an ancient but yet a percussion musket. In the Crimea we got the Minié rifle. That was followed by the Enfield, the Snider, the Martini-Henry; now we have the Lee-Metford; and the results of thirty-five years' work in the attempt to produce a perfect weapon of destruction have been collected by Captain James, and lie on the table before you. Although it does not follow that a rifle with a flat trajectory will make the most accurate weapon, it will yet make the most destructive one for military purposes. The flat trajectory is best given by a bullet whose length considerably exceeds its diameter, and which (for accuracy on impact) must travel end first at a high muzzle velocity. Such a bullet, however, will not travel end first unless you give it a spin, which is done by grooving the barrel. The giving of this twist requires strong explosive power in the powder to force the bullet into the groove and to give it muzzle velocity when it leaves the barrel. And lastly, when we have powder and barrel there comes the problem of the bullet, the present difficulty. We require a bullet which shall have an outside jacket soft enough to take the form of the grooves and yet have the proper hardness to prevent the core being driven through the bullet, which, when it occurs, renders the rifle useless for the day, until removed. That is what we are looking for. The lecturer has chiefly dealt with facts, and they have not been disputed in the discussion. I propose not to interfere between Captain James and General Keith Fraser as to the probable utility of cavalry on the field of battle. My opinion rather agrees with Captain James. On the other hand, I quite agree with General Keith Fraser that the accidents of the ground of the battle-field may give opportunities for cavalry action. The destructive power of small-arms and of guns will compel the offensive to work more from cover of ground or of woods, or at night, as in Egypt before Tel-el-Kebir, which will require stronger discipline and more intelligence on the part of the soldier. I agree with General Keith Fraser to this extent, that in the confusion of battle the possibility of getting to a flank may enable cavalry to find a part to play and possibly to carry out with great success. I think there is a little danger of reducing the size of our bullet so much that its effect on the human body is not mortal or disabling, and perhaps for some of our semi-savage enemies

it might be better to have a heavier bullet. Captain Egerton spoke about Volunteer ranges. I think that is to the point. There is no doubt these bullets do travel a long way, and if there should be many accidents from the rifles a great many ranges will be stopped, and that will be a very serious thing for the constitution of the Volunteer Force. Colonel Nolan said that for fine shooting it is not sufficient to have a flat trajectory that will hit a man all the way down the range. If you want to shoot as for bullseye shooting, the refinement of accuracy, I should very much doubt whether you would get it with a single-sighted rifle to 700 yards. It will do all very well so long as the enemy is standing up, but it will not do for men lying down or for match shooting. I will now ask Captain James to reply.

Captain WALTER H. JAMES : There appears to be very little for me to reply to. I must first of all say, with regard to what Major Palliser said, it always does seem to me that Mr. Lee has had scant justice done to him. He is undoubtedly the father of the central magazine. Years ago he invented it, and all these other magazines are more or less plagiarisms of his original invention. The central magazine, as I pointed out five years ago, was the coming magazine, and since then there is no Power that has adopted anything else. I am not an inventor ; I have nothing to do with any rifle in existence. I have always carefully kept myself in the impartial position of a critic, and that is impossible if one has any share in a rifle. With regard to the detachable magazine : I feel very strongly on the detachable magazine, and I believe it to be an enormous mistake to introduce it. It is a sort of thing you will never have when you want it, and to say that it is better than the filler, is, to my thinking, a mistake. A filler of that kind (showing the Belgian frame) is not rickety ; it is as strong as you can make it. It is a little steel bar. I do not say that all I have shown are perfect fillers, but I do say that one used in the Belgian Mauser has all the advantages of the detachable magazine and none of its disadvantages. One detachable magazine would weigh just twenty of these frames, and that alone is a good reason why we should rather have the frame than the detachable magazine. And, in the rough and tumble of a campaign, I think a detachable magazine is much more likely to come to grief. It must be thin, either thin steel or brass, and in the kind of country Englishmen habitually fight in, I think you will find the magazine itself would be extremely liable to deformation, far more than a simple carrier like the filler for the Belgian Mauser. It is all very well to take the one instance of the use of the spare magazine from one man. What you have to think about is not one man galloping on horseback, but 10,000 infantry soldiers on foot and 10,000 more within 200 yards, and at such a moment I believe that the somewhat complicated process of detaching a magazine to put another on is not as likely to be properly carried out as the simple process of putting this frame into the magazine, in which process you can attain a high state of perfection by daily drill. With regard to what General Keith Fraser said, I know he and I differ on that particular point. It is a matter, if I may venture to say so to him, that is always put forward that cavalry are to do these things ; but from the days of the invention of rifles, onward, I do not know an example except the well-known case at Mars-la-Tour, where a great cavalry charge has been successful. The Custozza example was a small one.

General KEITH FRASER : A small force of cavalry.

Captain JAMES : A large force of infantry in disorder, more or less.

General KEITH FRASER : No.

Captain JAMES : They had been marching wearily forward when they were suddenly rushed on.

General KEITH FRASER : No, marching forward into position.

Captain JAMES¹ : But take the case of Margueritte's charge at Sedan ; there is

¹ General Fraser did not state what particular cavalry attacks at Custozza he alluded to. But I think anyone who reads the Austrian official account ("Österreichs Kämpfe im Jahre, 1866," of which a bad French translation, "Les Luttes de l'Autriche," &c., also exists), will see that in the case of Bujanovic's brigade and the Emperor's Hussars, both of which broke squares, that the quality of the Italian troops attacked was not of the highest grade. The same remark applies to the Sicilian

a typical case. The cavalry came downhill; the ground was favourable for a cavalry charge, but they practically did no harm to the Prussians. I do not deny, I shall always believe, that there are opportunities for cavalry in small forces on the battle field, but I do not believe in large massed charges, because it seems to me it can be so rarely that these can be conducted under the conditions of surprise which is the postulate for the success of any cavalry charge. But I am quite certain, although the cavalry may somewhat, in that direction, have their rôle in future warfare diminished, that their rôle in warfare in general is very largely increased. For instance, take deliberate battles to be fought in any European war: the rôle of cavalry will be a great one, especially when it is armed with a proper magazine carbine. They may carry out great turning movements in large masses. The first intimation to their opponent will be a cloud of dust on his own cavalry driven back. It is all very fine for him to argue that behind that—the advancing cavalry—there will be nothing else. He does not know it, and therefore the moral, as well as the physical, effect of cavalry, and in this way, in future war, will have the very greatest influence on the issue of the fight. But I am inclined to doubt whether, on the actual battlefield, we shall see anything more than charges executed by small parties of cavalry. These always have been executed and always will be, and where they are enabled to introduce the element of surprise, they may be successful. In the last German manœuvres there was a striking instance of a Uhlan regiment charging and with the greatest effect. I quite agree with what General Keith Fraser says, that he does not want to see cavalry turned into the animated machine-gun of Major Palliser. I am sure he is right there, because the true weapon of the cavalry soldier is the *arme blanche*, whether the lance or sword. His duty is to get to handy strokes, and on the doing so depends the success of his action. With regard to the “setting-up” question to which Captain Egerton alluded, I am very much inclined to agree with what he says. I think for savage warfare it is undoubtedly desirable to have more stopping effect than you require in European warfare. I remember being very much struck with a Zulu I saw, who surrendered after Ulundi. He had been at Isandlwana and he had been shot through the lung and the bullet had broken the shoulder-blade. He could not lift the arm; you could see the shoulder-blade in pieces beneath the skin, but nevertheless the man really did not appear to be any the worse from the result of his terrible wound. No European would have lived through that, but savages appear not to have developed that high organization that renders men of civilized nations more liable to die. Of course long-range weapons require long-range sights, but although it may be difficult to devise this, it cannot be a reason why we should stop short at a short-range rifle when other nations are going in for a long one. With regard to what Colonel Nolan said as to fine shooting, I draw a great distinction between fine shooting at a target and shooting on the battlefield. I do not believe when men are advancing against you, when your nerves are not in the state they are in at the present moment, that you can really obtain that fine adjustment of sights which you want for fine shooting; and it is far better to have a system of sighting which will enable you to use fine shooting at target practice and at the same time give the one sight on the rifle which shall be for practical purposes sufficient for shooting up to 800 or 900 yards. With regard to shooting at your enemy lying down, my advice would be the same as that given by “Punch” to those about to marry—“Don’t.” If your enemy is lying down at 800 yards, you had better keep your bullets in your pouch, and as he cannot crawl forward on his stomach from 800 yards up to the point which you are occupying, you will have lots of opportunity of firing your bullets into him when he is erect on his legs. This seems to me, again, an argument for the one practical sight which does not presuppose an iron nerve. We all know that soldiers are very brave men, but their nerves are not always as good under fire as they are in the barrack square. I think that is a fact we should take into consideration, and that, therefore, the one

Lancers charging Forli's and Pisa's brigades. Pulz's charge near Casetta was made against men retreating in disorder, while his later operations and Bujanovic's were not successful, the latter Officer being wounded and taken.

practical sight is, to my mind, the sight for use in actual shooting against an enemy who is shooting against you. With regard to Mr. Heath's question about sights, I have a Mark II rifle here. Most foreign nations have the older form. The question which is the best is one that I cannot settle; there is as much to be said on the one side as the other.

The CHAIRMAN: I am sure you will allow me to thank Captain James, on your behalf, for this very interesting lecture.

4.

Fig.5.

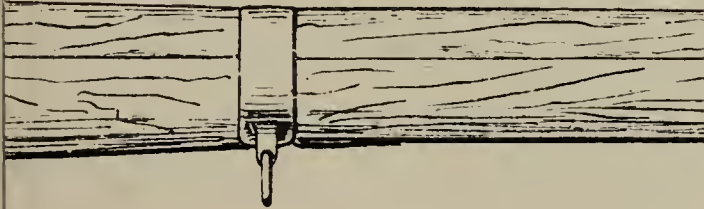
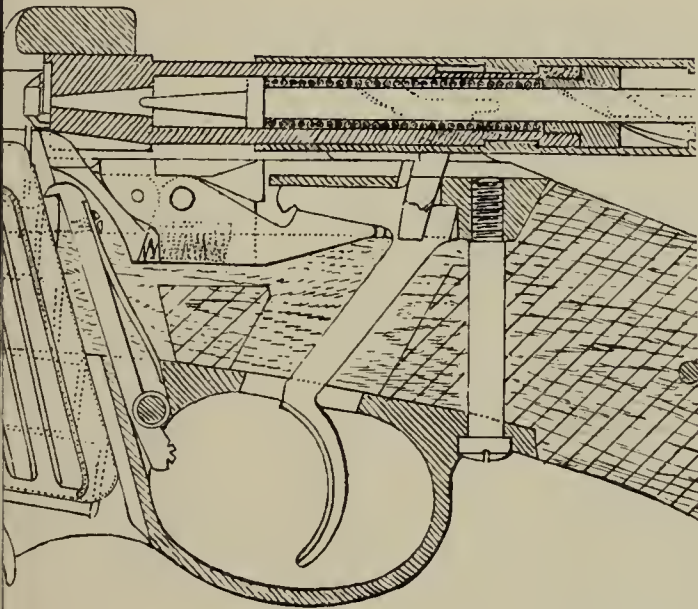
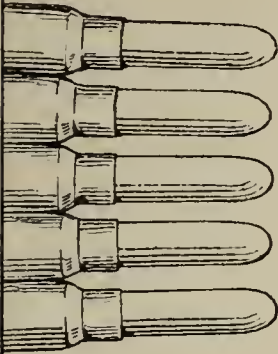


Fig. 1.

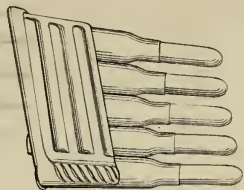


Fig. 2.

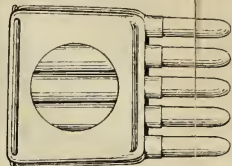


Fig. 3.

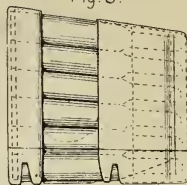


Fig. 4.

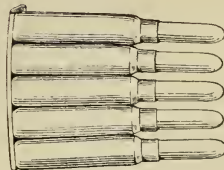


Fig. 5.



Fig. 6.



Fig. 7.



Fig. 9.

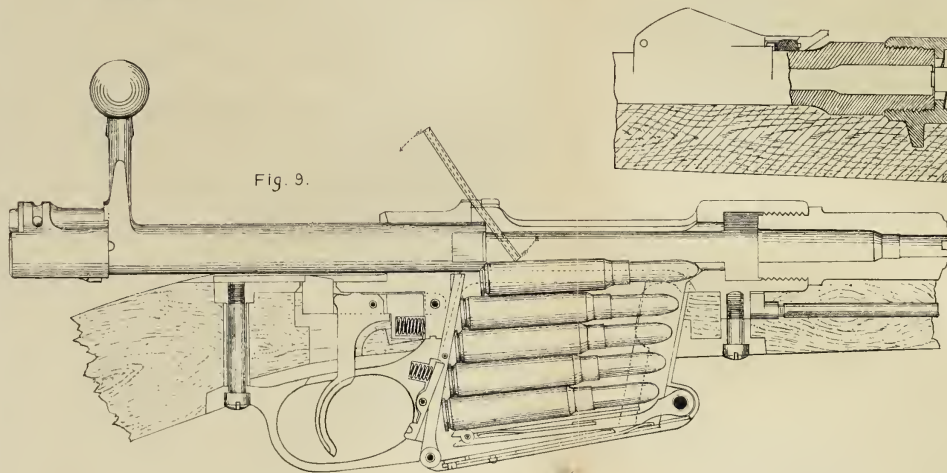


Fig. 8.

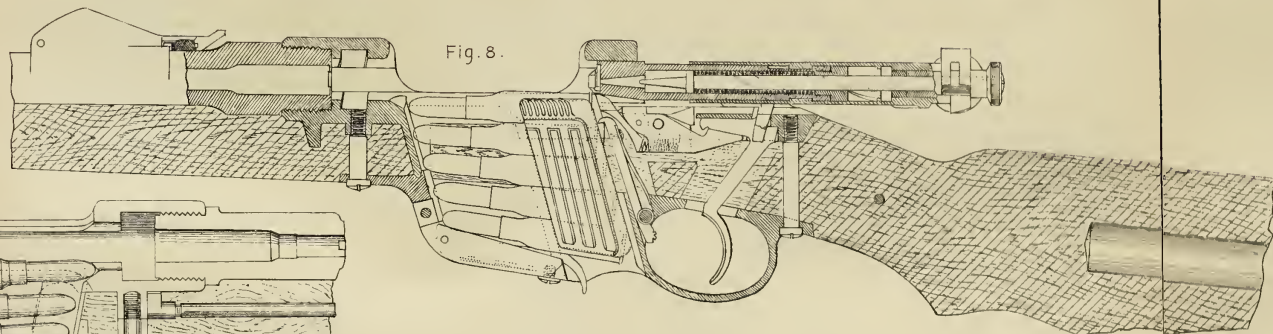
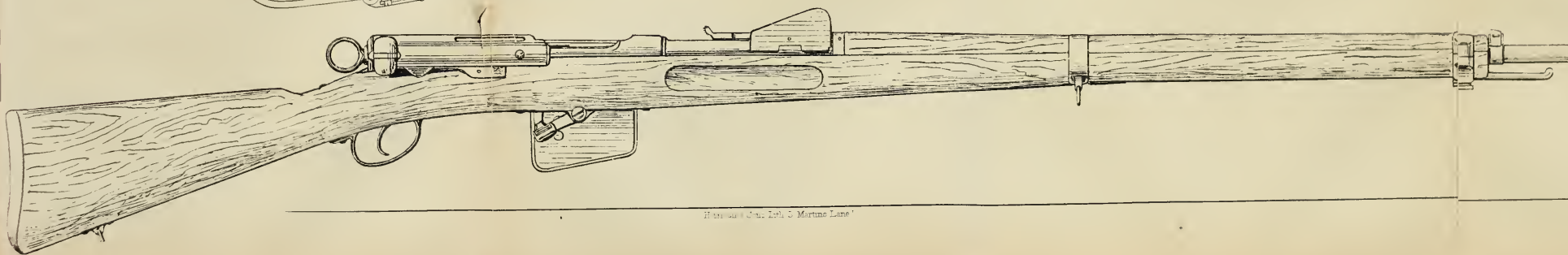


Fig. 10.



Friday, July 8, 1892.

MAJOR-GENERAL J. KEITH FRASER, C.M.G., Inspector-General
of Cavalry in Great Britain and Ireland, in the Chair.

SADDLES.

By Colonel the Hon. H. G. L. CRICHTON, Commanding Hampshire
Yeomanry.

THE subject about which I have been asked to lecture is a wide one, and includes a variety of different descriptions of saddles. I propose to confine my remarks to the military saddle.

There is an old saying about putting the saddle on the right horse, but the greater difficulty always has been rather to put the right saddle on the horse, and this difficulty has existed in a great degree ever since the experiment was first tried, but I feel fully convinced that a better saddle might be placed upon the English cavalry horse than he has been made to carry of late years; and I believe that the public lectures which have been given in military societies, such as the one in Dublin by Veterinary Lieut.-Colonel Thompson and at Aldershot by Veterinary Captain Smith will be of the greatest benefit by drawing the attention of regimental Officers to what is below the surface of the horse, and so showing where the pressure may and where it may not be placed.

A horse is the most patient of sufferers, and to a certain extent a cavalry Officer is at a disadvantage in comparison with an infantry Officer when trying equipment experiments, as the poor animal cannot express its approval or the reverse of the trial, but there is one thing certain that the horse's back will tell no lies, and if the equipment is not a good one the back will precious soon show it.

In a most excellent book called "Manual of Saddles and Sore Backs," Veterinary Captain Smith gives a picture of a horse with a regular tale of horrors in the way of sores on his back, and the poor brute's eye is admirably depicted to show the pain he is suffering; as this book is very widely read, I feel I ought in justice to the British cavalry Officer to say that the causes for the greater number of these sores no longer exist, as they were inherent to a particular saddle, which is also depicted in his plates, but the manufacture of which has long since ceased, and if there are any of these saddles still retained in the Service they should speedily be destroyed, or they will prove disastrous to those who may be doomed to use them on service.

There has been held in London quite recently an exhibition of saddlery at the Saddlers' Hall, where amongst many other articles of saddlery were collected the latest military saddles from eleven European armies; by the courtesy of the Saddlers' Company I was enabled to thoroughly examine them, and also to make drawings of them, which I have enlarged and now produce. To try and make my lecture interesting and possibly instructive, I feel I cannot do better than make a comparison of these different equipments, and to try to draw inferences therefrom. Military saddlery is a subject to which I have given a deal of attention for many years, and, therefore, I hope I may be excused if I am found criticizing occasionally, and frequently giving my opinion; it will be done with the best possible intentions for the good of the cavalry service of all nations.

No nation need certainly be jealous of any one having copied from the other, as I never saw eleven machines all intended for the same purpose so dissimilar one from the other.

The Italian. (No. 1, Plate 28.)

The arches of this saddle are made of wood, and appear very strong; they slope outwards.

The seat is a loose pilch padded in strips; it rests on a strong piece of leather, which is attached to the two arches.

The side-boards are short, like a pack saddle.

There are thickly stuffed pannels, lined with flannel; they are about 1 ft. 9 in. long by 1 ft. deep.

A large thick white blanket is placed under the pannels.

The buckles are galvanized.

The girth is a very broad one, and made of twenty-one thick pieces of cord with three girth-tabs.

The kit is carried in two sheepskin bags, which are hung on each side of the saddle behind; two pockets in each sheepskin.

The saddle has rather a weird appearance, and has what we should call a great fault, in that everything is covered up, and you cannot see anything that may be put on wrong underneath and so be doing damage to the horse's back; the whole is exceedingly cumbersome and weighty, and I should have thought the men would sit very high above their horses, and so have little control over them with the leg, as well as making the whole top-heavy and inclined to roll.

The American. (Nos. 2 and 3, Plate 28.)

The American saddle is, like most other things of this nation's, most original and clever.

The tree is, I presume, a mixture of wood and iron, built up like a plain hunting saddle, but as it is covered over with black leather I could not tell its construction.

The side-boards are short and have a very wide bearing, and are very close together along the backbone.

A large thin grey blanket is used under the side-boards, but I

could not see how it is prevented from slipping if it has a mind to do so.

The girth has the widest bearing on the saddle of any shown; the straps go right over in front and behind the arches, the lower part of girth is very short, and is made of strong dark horse hair twisted up into twenty-four cords between two heavy rings which are fastened with leather thongs to the rings which join the girth-tabs together.

The carbine-bucket is a very short one, with a hole in the bottom of it, and, without seeing how it is carried, it is difficult to understand how the carbine escapes injury.

The stirrup is most peculiar, it is made of wood with a black leather guard in front of it; it is very light, and I am told the use of it is to protect the foot in riding in long grasses.

There is no seat nor are there any flaps in this saddle; it is very light and workmanlike, but I cannot express an opinion as to the comfort or otherwise of riding in it in hot or wet weather.

The Dutch. (No. 4, Plate 28.)

This is a saddle of a very novel and ingenious description. The front arch appears to be flat iron or steel set on edge and sloping back, the rear arch is also of flat iron.

The cantle is long and flat, instead of standing up like most cantles; thus the cloak or kit is strapped on top of it instead of behind it, which insures its being kept off the horse's back, but has the great disadvantage of causing top weight. I should also think that if subjected to rough treatment the cantle would be very liable to be broken off.

The peculiar feature of this saddle is the way in which the side-boards are made adjustable to the shape of the horse's back, being on a hinge with the two arches; the hind arch is continued all the way under the seat to the front arch and the stirrup leather goes round it.

The seat of the saddle looks very comfortable; it is cut in strips and sewn up again, with a second layer of leather underneath treated in a similar way, so as to arrive at the proper shape and make it strong; we might well imitate this seat.

The flap is of a peculiar shape, the lower part of it very far to the front.

The girth comes direct from the front arch and has to be kept back by a strap from behind the flap on the side-board. I cannot think this a good plan, as I should say it would make wrinkles on the girth in a dangerous place, and the lead of the straps does not look right; the girth is of brown canvas.

There is a small bucket which looks as if it was intended to carry the carbine in front of the saddle on the off side.

The wallets are capacious.

Altogether this saddle shows that the Dutch cavalry have been very much alive to the changes of modern times in cavalry equipment, and have profited thereby. There was nothing to show what was

worn between the saddle and the horse. I should like very much to provide them with the numnah and blanket of the equipment I advocate, and another girth attachment.

The Austrian. (Nos. 5, 6, and 7, Plate 28.)

The front and hind arches are made of 3-in. broad, hollowed-out iron, with a long cantle.

The side-boards are roughly made, are short, but appear very strong and of a good shape.

The seat is padded and stuffed, passed over the cantle, and fastened to the front arch; it rests on a strong piece of leather, which is attached to the arches and the side-board by thongs. The flaps are one with seat and appear very broad (18 in.); they are padded in front.

The wallets are very capacious; there are two pockets in them for ammunition, and an attachment which looks as if it was intended for carrying a peg.

The shoe-case is half under the flap.

A small hunting breast-plate.

The blanket is an excellent one; made of white flannel, it is large and thick, and consequently heavy.

There are two girth straps well back on the side-board, and a hard black leather girth.

The peculiarities of this saddle seemed to be the enormous amount of leather in the flap with a stuffed pad in front of it, and the beauty of the thick white blanket, but I could not see how the blanket is prevented from working back. The stirrup-irons appeared to be very heavy; we might with advantage copy the material of the blanket and take a lesson from the side-boards.

French. (No. 8, Plate 28.)

The arches are made of broad flat iron, hollowed, with a thick rim.

The side-boards are wood, and long and broad.

Pannels are attached to the side-boards; they are lined with strong canvas.

The seat appears a comfortable and capacious one, of thick leather, supported by canvas, and fastened with copper rivets to the side-boards.

The wallets are large.

The shoe-case is carried on the off side and is of a peculiarly good shape.

The girth looks an excellent one, composed of six pieces of webbing joined with leather pieces.

The buckles are some of them brass and some galvanized.

There is no numnah or blanket shown, but the French, I know, use a dark-blue blanket.

The pannels and the tree of this saddle appear very heavy, the

seat and flaps are of a good shape, and the shape of the shoe case is well worthy of imitation.

Danish Cavalry. (No. 9, Plate 28.)

This saddle has only one arch, which is in front, and is a small piece of flat iron; it has no side-boards.

The pannels are broad and thick, and lined with canvas.

The seat and flaps are all in one and appeared to be the foundation upon which the whole fabric was built; the seat was joined down the centre, and made of a very thick leather, with a strong ridge behind to keep the man in the saddle.

The wallets are of a medium size.

The saddle bags are of canvas with a leather covering, hung by two straps, one over the seat and one over the hind part of the saddle.

The girth is made of thick webbing with two girth tabs, in which there are eyes, only the strap and buckle being on the girth.

The buckles are black.

There is no blanket, but a very large felt numnah.

This I thought a most peculiar saddle; being without a tree, it certainly adjusts itself to the shape of the horse's back, which is right in theory, but I should have thought it would have been pulled out of shape by the powerful method of girthing up the horse, and the girths, surcingle, and stirrups are all fastened to the flap. The narrow strap for saddle bags across the seat and the ridge behind cannot be conducive to the comfort of the rider.

Danish Artillery. (No. 10, Plate 28.)

The arches of this saddle are of wood, with steel plates let in front and rear, and are consequently very strong.

The side-boards are rather flat, very much turned up in front.

There are no pannels, but a good red blanket.

The girth is a thick leather one, with one large buckle.

The wallets are of a peculiar shape, square at the bottom, with a large cover.

The buckles are all galvanized.

The seat is a sort of pilch, which rests on leather stretched between the arches; the seats and flaps are in one.

There is a very small bucket, which looks as if it was intended for carbine, on the off side, near the wallet.

This saddle appears of a more recent date than the cavalry saddle of the same nation; the tree appears of excellent construction and well worthy of note; the blanket and wallets are good; the girth is peculiar; the seats and flaps cannot be properly judged unless ridden in, they are evidently very light.

Belgian. (No. 11, Plate 28.)

The arches are flat broad iron, rather weak I should have thought.

The side-boards are short, and they have under them thick white numnah pannels.

There is no blanket shown with the kit, but I expect there must be one used. I should be sorry to trust the numnah pannels without one.

The girth is composed of sixteen cords run through strips of raw hide.

The wallets do not look very large; they are covered with a cloth covering, which has the number of the regiment and a crown upon it.

The buckles are some brass and some steel.

The seat looks a very good one, and the flaps of a moderate size.

The saddle bags are capacious, but I should have thought they would have interfered with the movements of the horse from being so far behind.

The cloak is fastened on top of the cantle, which lies flat; this is an excellent plan for keeping everything off the horse's spine, but increases top weight.

This is a very neat looking equipment (bags excepted), the girth appeared an excellent one, and there is a rolled head or heel rope.

German. (No. 12, Plate 28.)

The arches are made of broad iron, hollowed, with a long cantle, and are attached to wooden side-boards.

There are no pannels, but a good big blanket with eight thicknesses. I could see no way for keeping the blanket in its place.

The girth is of leather with three long tabs.

The wallets are narrow, but broad on top.

There is a shoe-case with a rope coiled round it.

The seat is a pilch one.

A corn sack is carried behind the saddle, with corn at each end; the cloak is strapped under the cantle. The whole is covered over with a shabraque, which hides everything from view, and must be hot.

The stirrups have two lance buckets a-piece; it is a cumbersome and heavy equipment, and nothing very worthy of note in it.

The Greek Artillery. (No. 13, Plate 28.)

This saddle has iron arches and wooden side-boards, with black numnah pannels.

There was no blanket shown with the saddle, but the pannels looked as if they would require something between them and the horse.

The girth is of black hard leather.

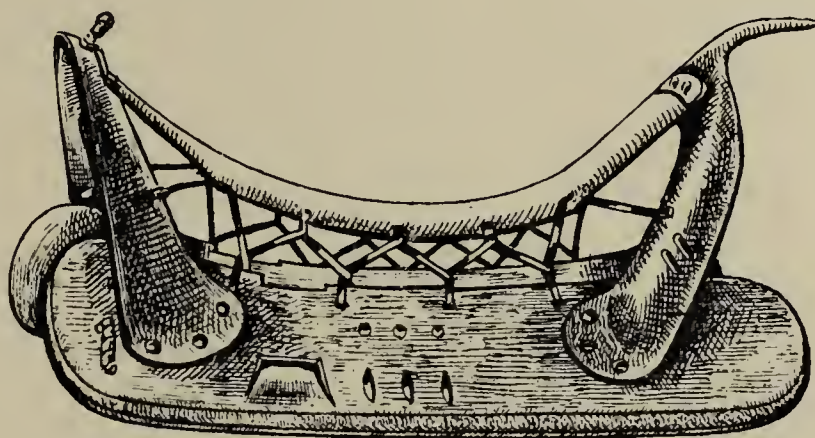
The wallets are capacious.

The buckles are steel and galvanized.

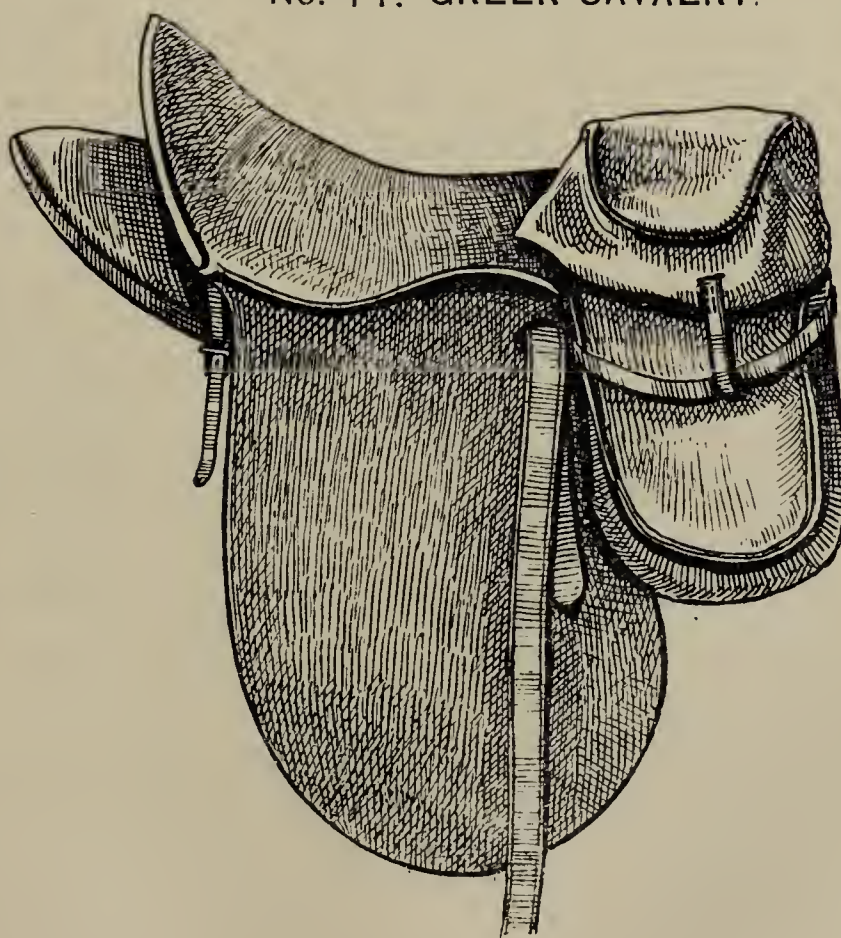
There is a shoe-case on the off side.

The seat and flaps are all in one, and supported by rather a narrow piece of leather stretched between the arches, which give

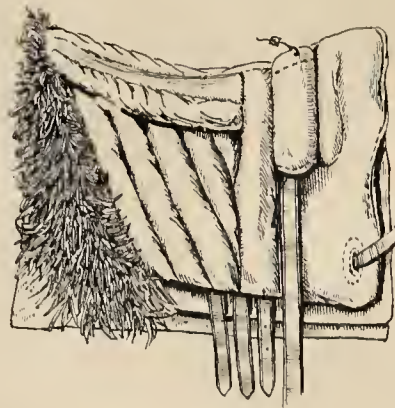
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(TREE.)



No. 14. GREEK CAVALRY.



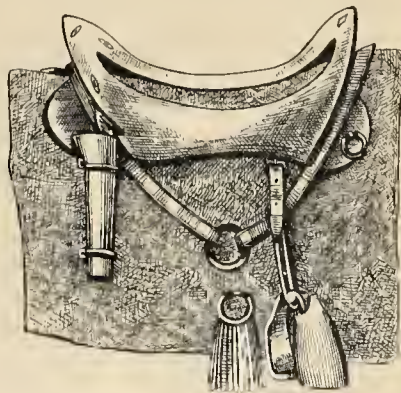
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No. 2. UNITED STATES, AMERICA.



No. 3. UNITED STATES, AMERICA

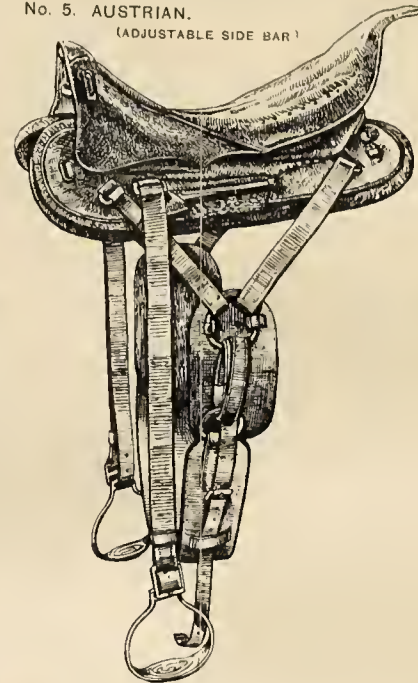


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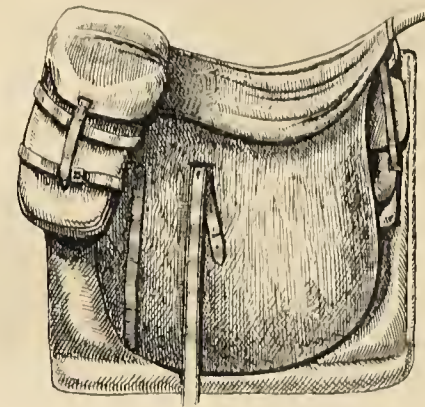


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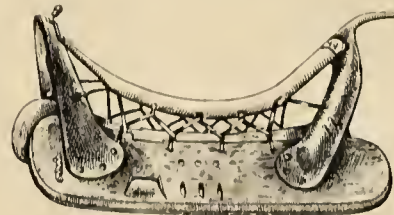
(ADJUSTABLE SIDE BAR)



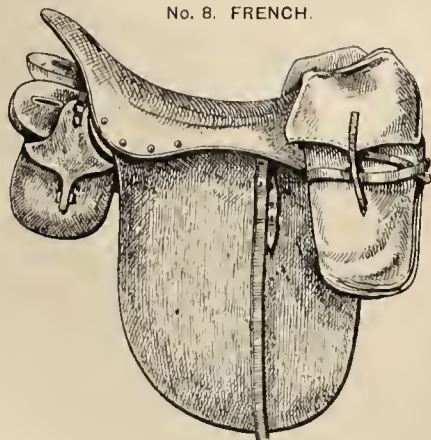
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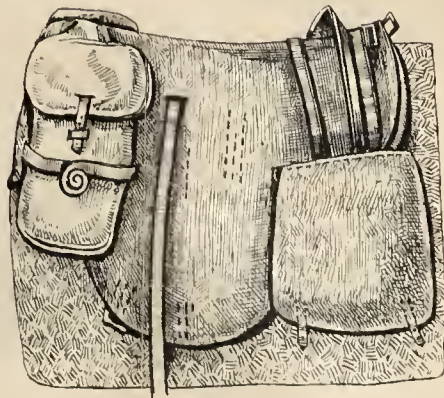
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(TREE.)



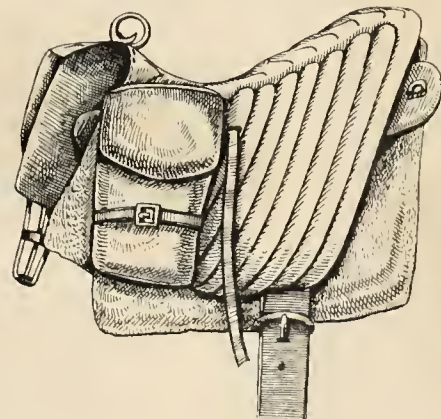
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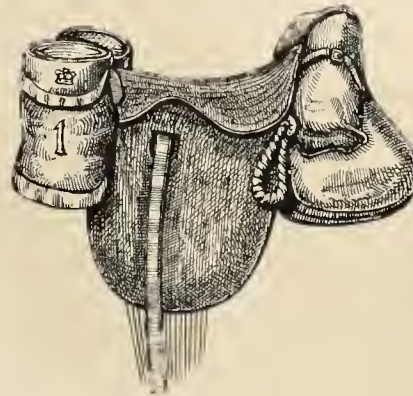
No. 9. DANISH CAVALRY



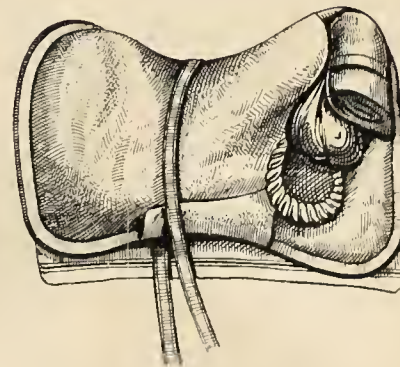
No. 10. DANISH ARTILLERY.



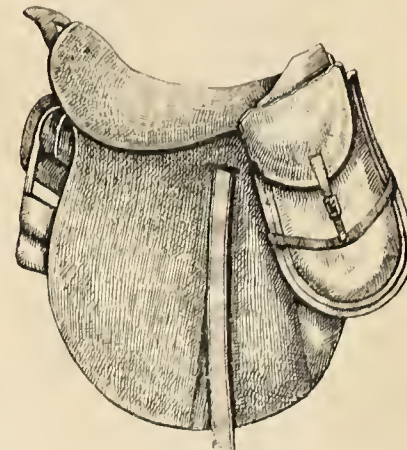
No. 11. BELGIAN.



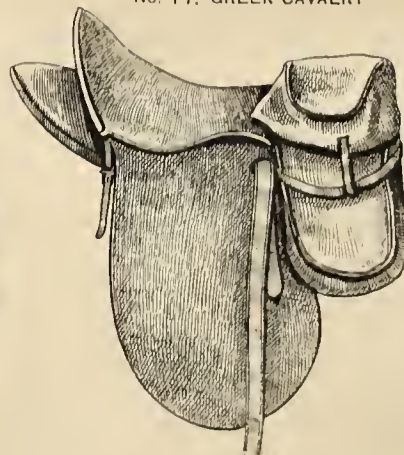
No. 12. GERMAN.



No. 13. GREEK ARTILLERY



No. 14. GREEK CAVALRY



the appearance of a saddle the reverse of comfortable to ride upon; the flaps have a pad in front.

The tree of this saddle seems to be of a modern construction; the stirrup leather passes through the side-board, but not in a way to cause an unevenness.

Greek Cavalry. (No. 14, Plate 28.)

This saddle is of the old post-boy and artillery driver pattern.

The side-boards are wood, with fully stuffed pannels, long in rear but no projection in front.

The girth is a web one like our plain saddles.

The wallets are very capacious.

This is the only saddle apparently which has a crupper, which shows how little that instrument of torture to the horse is now considered necessary.

This seat looks as comfortable as the Greek artillery looks the reverse.

Russian. (No. 1, Plate 29.)

The arches are of round iron, liable, I should have thought, to open; they slope outwards, the side-boards are wood, square behind and short, very much turned up in front, and close together.

There are white numnah pannels on the side-boards.

There is no blanket, but two large pieces of white felt, the upper one is covered with Russia leather.

The girth consists of two pieces of raw hide, very wide apart, with another piece of hide about a foot long to keep the two from separating under the horse; these straps go over the side-boards under the seat.

The wallets are like two little kit bags, with a cord at the top to close them; they are small.

The seat is blocked to fit over the arches, and looks a very comfortable one.

The flaps have a padded front.

The saddle bags are capacious; they hang not across the seat, but over the numnah behind the cantle.

This equipment is the most remarkable one in the Exhibition, and for excellence of work could not be excelled; the whole is made of sweet-smelling Russia leather; the straps are rather delicate, and I cannot think it is exactly the saddle which the Cossacks of the Don use. The horse must be very much covered up by the large pieces of felt, which constitute the numnah and blanket, surmounted as they are by a large piece of Russia leather, which combined reminds one very much of an apparatus used for hot fomentations, but the girth, the seat, and the two layers of felt are well worthy of note and consideration.

British. (Nos. 2, 3, 4, and 5, Plate 29.)

The arches are of steel, with points below their side-board. The side-boards are long and narrow at the end, with a piece of leather round the rear ends to prevent their being chipped.

There are no pannels, but a thin brown blanket is placed between the side-boards and the numnah; the numnah is shaped like the reversible numnah recommended by me, but the straps are so sewn on that it cannot be reversed.

The wallets look small when compared with the other wallets in the Exhibition.

The seat has a division down the centre, something after the principle of the American. I believe this is not approved of.

The girth is a leather one.

The carbine bucket is hung on the off side, and attached to the girth by a strong piece of leather.

The side-boards are made long and narrow for carrying pannels, and it stands to reason that if these latter are discarded the side-boards want alteration.

Turkish Cavalry. (No. 6, Plate 29.)

Turkey has sent, since the Exhibition of Saddlery was closed, most complete sets of cavalry and artillery saddlery.

The arches of cavalry saddles are hollowed-out iron, very broad, a high front arch, and a long cantle.

The side-boards are wood, same breadth all along, and short; they carry pannels, beautifully stuffed, of the same shape as the side-boards.

The stirrup leather goes through the centre of the side-board, in a very bad place. It would be very well for Turkey if they took a hint from the Austrian side-board, of the best way for the stirrup leather to hang; the leather is under the flaps.

The wallets are large, but lie very flat; they are about half the thickness of our own; in the near one there are two pockets for ammunition; in the off one a place for shoes. The seat is a loose pilch, and great trouble is taken to make it soft; there is a broad piece of leather stretched under the seat.

The girth is a web one, with three straps.

The shoe-case is a very good one, like the French, and on it is rolled a rope.

There is a little shabraque, which is lined with felt.

The artillery saddle has same description of arches and side-boards, but a large blanket, 8 ft. by 6 ft., instead of pannels.

The shoe-case is like the British.

The girth is leather, with one large buckle.

The whole kit is very complete; collars seem very well stuffed.

Cow-boy. (No. 7, Plate 29.)

The arches of this saddle are made of wood, covered with raw hide side-boards ditto, which make it very strong.

The girth is in two pieces, one in front, and the other behind, the saddle, and can be joined under the belly; the stirrup is very far back, and goes over the seat. The flap is attached to the stirrup leather.

There is a sheepskin bag behind, like the Italian, for carrying kit.

Under the pannel is a leather, lined with felt, on which the saddle rests.

There is a red blanket next to the horse.

The two girths are of strong cords under the horse.

This saddle is very strong, as can be seen any day at the Wild West show. They say it seldom breaks, and it gets very rough work. The front girth is the main one, and is very far forward; it can be tightened to any extent by the long leather strap which passes between the two rings. From the girth being so far forward, it is kept tight by the weight of man in the saddle acting as a lever against it. It is very remarkable how these saddles cling to the back. A man can drag himself from under the horse's belly up into the seat without moving the saddle. They have no points; they say the blankets do not slip back, and that the saddles never gall the horse.

The flap being attached to the stirrup leather appears a very sensible plan, as it requires only a small piece of leather, and it is always where it is wanted; whereas with a large flap a great deal of it is never used, and it tends to make the horse hot, besides being heavy and expensive.

Crichton. (No. 8, Plate 29.)

The arches are made of steel; there are no points below the side-board.

The side-boards are broader than the British, and the ends are not so pointed.

There are no pannels, but a blue blanket, about 6 ft. square, is carried between the sideboards and numnah.

The numnah is so shaped that it can be reversed and used either side to the horse, or either end to the front, and there is a strap at each end to attach it to the front and hind arches of the saddle.

The wallets have tins inside them which keep them in good shape, and enable the cloak to be tightly strapped to them, whether they are full or empty.

The buckles are all brass.

The seat is rather longer than the British, and supported by welting.

The stirrup leathers are passed through a bar on the side-board, and not through the side-board itself.

The girth is a leather one, cut in strips on each side.

The carbine bucket is like the British.

Now I will endeavour to compare all the foregoing saddles, and see how far different nations are agreed, and how far they are at variance, and when I express opinions on their suitability, or otherwise, I do so simply from observation, and therefore am very subject to correction, as I always hold two things about saddlery, that no opinion is worth a rap unless formed after personally trying the equipment by riding in it a great many miles, and seeing it tried on a number of horses for a period of a year or two by different corps. I have had no opportunity of trying any of the saddles except my own, nor do I know how far any of them have been tried, except the British, and some of them look to be of a very novel construction.

On the question of the material of the arches of the saddle, out of 13 shown I find 5 wood and 7 iron, and 1 no arch at all to speak of, viz., the Danish.

There are a variety of iron arches, broad, flat, and curved with a strong rim like the French, Austrian, Dutch, Belgian, Hungarian, and Greek artillery are the most common; the round iron, like the Russian, and the angle steel, of which the British are made; of these I should say decidedly that our latest steel arches are the strongest. Iron is always liable to open, if not by use by a sudden blow, or horse rolling upon it. This may be said of a wooden arch, with regard to violence, as the latter, when combined with iron plates, may be smashed, but will never open, and if smashed up it cannot help being noticed, whereas iron arches may be opened by a blow, or gradually opened by pressure, and the horses gradually suffer from a badly-fitting saddle; and if one opens from pressure, the probability is all of the same pattern will do so, without any possibility of cure, as when iron is closed by force it will open again all the more easily when pressure is applied.

The wooden arches are favoured by Italian, American, Danish artillery, and Greek cavalry; of these the Italian and Danish artillery seem very strong; the American and Greek, being covered up with leather, I could not judge of; the Danish artillery struck me as being the best one in the Exhibition, with a broad and long piece of steel on edge let into the wood, it would take a tremendous blow to smash it, and it could not open.

Points.

We have always had in our English saddles certain things called points, which are the continuation of the front arch below the side-boards; these, as a rule, bear either too hard or not at all; in the former case they utterly upset the balance of the saddle and hurt the horse, in the latter they are useless. In saddles of my own pattern I have lately done without them with beneficial results, and I do not find a single saddle of the thirteen, except the British, which has points.

Side-boards.

The side-boards are almost the most important part of the saddle, as they are the medium for conveying the whole weight of saddle, and whatever is carried upon it, to the horse's back. The following have a short sideboard: Italian, American, Dutch, Austrian, Belgian, Danish, Greek artillery, and Russian; the British, French, and Greek have a long one. The disadvantages of side-boards being long behind are that the further back pressure is placed on the horse's back the more the friction, owing to the movement of the hind quarters, and the longer the saddle the greater will be its movement at its extremities.

The advantages of having a long side-board are that it enables the kit or cloak when placed behind to be better carried than on the short one, and therefore I consider the best saddle is the one with a long side-board, so arranged that the last 3 or 4 inches of it can carry the kit but not touch the back; this can best be done by the blanket being folded of a certain length and carried between the numnah and saddle, and this arrangement I have found to answer admirably. Now I wish to draw special attention to the side-boards of the Dutch saddle, which reminds me that the Dutch have considerable experience in side-boards of another description, viz., on their boats, which may possibly have specially directed their attention to the subject; these are intended in a very simple way to adjust themselves to the shape of the back, but I hold that their doing so leads to another danger, as it cannot be expected that a horse will lose or gain muscle in the same degree all over the back, and suppose the back alters shape under the seat of the saddle where the greatest weight is, the board would adjust itself accordingly, which action of it might bring the edge of the board in front in contact with the side of the withers where the horse might have altered shape in a converse way to the back. For this reason I must here mention a saddle which was shown at the Exhibition by the gallant Officer, our Inspector-General of Cavalry, who has done me the honour of taking the chair at this lecture, which saddle obviates this objection, as the front part can be adjusted in one direction and the rear in another; this is excellent in theory, but what it would be in practice I cannot say, but I hear of a very successful trial of thirty of them by the 7th Dragoons in Austria. I should be a little afraid of uneven pressure in them on account of the breadth of the hinges. What, I think, is of the greatest importance in the fit of a side-board is the curve in its length more than in its breadth, as horses differ almost more in that way than the other, and the amount of weight at the moment it is placed on their backs will increase the hollow, as well as age. I should therefore like to see a side-board which would adjust itself to the hollow of the back as well as the other way. I have heard of a steel (board I cannot now call it) bar performing these functions, and I should be very glad to hear more of it. If a side-board is too straight it rests on its two ends, and if it is too curved it rests on a small piece in the centre.

This of course can be met by clever and careful folding of the

blanket so as to make up the deficiency, but a good fitting side-board is the foundation of successful saddlery, and the best one can do now is to get a side-board shaped in a medium way which will be most likely to fit best the greatest number of horses.

Pannels.

Of the saddles in the Exhibition I find only three have pannels, viz., the French, Danish, and Greek cavalry.

I know that pannels have some very strong advocates, and they may be very well when there is a saddler close at hand to teaze and arrange the stuffing exactly where wanted; but stuffing is very contrary, and will not always stop where it is wanted, and in a strong regiment, moving, perhaps, every day, pannels get hard and lumpy, and there is not time to teaze and arrange them, no matter how efficient the saddler sergeant and his assistants may be; it is a long business arranging the stuffing of a saddle, and also when a regiment is much scattered it is impossible to send a saddler with every party.

The plan of chambering a pannel, that is, taking all the stuffing away from one particular spot, where the horse's back is sore, may sometimes answer very well, but it is a dangerous experiment, as no one can depend upon a saddle remaining in exactly the same place on a horse up hill and down hill and on the level, and if the edge of the chamber gets on the sore, the remedy intensifies the malady in a very short space of time; when the hole is made large enough to prevent any possibility of the sore being touched, the extent of the bearing is so much reduced that another part, where the bearing becomes excessive, will probably suffer. The best and surest remedy, I believe, is to have the horse that is touched in the back led for a day or two without a saddle, and the man mounted on a sick man's horse, or go as baggage guard. I am not an advocate, when the skin is really broken, of tinkering with the back, either with a pannel or a blanket, as the least friction then delays the cure; lumps and swellings may be overcome by arrangement of saddlery, but when the blood appears it is time for the veterinary art to step in and give the part rest. I must say I think the majority of foreign nations are right in discarding pannels and adopting

The Blanket.

Of the 14 saddles under discussion, 3 have pannels, 7 blankets, 2 numnah pannels, 1 side-board only, Dutch; 1 double layers of felt, Russian. I should say that the two with numnah pannels, viz., Greek artillery and Belgian, must use blankets as well, and the Dutch must have something under the side-boards, which would probably be a blanket, and, if so, the numbers would mount up to 3 pannels, 10 blankets, 1 numnah layer. I will state what I have, from long trial, gathered to be the advantage of the blanket over the pannel.

1. It answers the double purpose of covering the horse as well as a protection of the back; the pannel does the latter only.

2. It saves the expense of pannels, as a horse blanket must be carried, either on or off the horse, though pannels are used.

3. If the horse blanket is carried on the horse, as well as the pannels being used, as in the Italian equipment, the weight is doubled unnecessarily by pannels.

4. The blanket does not move with every movement of the saddle, as the pannel does, and so scrape the surface; there is, I believe, less movement in every fold, as it gets nearer the back; this would appear a theory, but I have derived it from the observation of horses which came in sweating after work. When ridden with pannels the shape of pannel is observed on the back, whereas when ridden with side-boards and blanket, you cannot discern the shape of the side-boards on the horse. Again, the hair on the back of a horse ridden much with pannels, and where the pressure is uneven, will become closely shaven, as if with a razor, and sometimes bare of hair altogether; although in neither case actually sore, it is liable to be so; this will never occur on backs ridden with blanket.

5. Every time the blanket is unfolded and refolded it is to the saddle what teasing pannels would be, it becomes quite soft, and the bearings are not in precisely the same way as before; to put it in another way, it must feel to the horse what it is to an invalid with a weary back when his bed is made afresh; and when it is considered that this can be done in a few moments in the middle of a long march no one can but allow that it is of inestimable value.

I may be told that there is danger in doing this for fear of not putting it properly together again; there may, of course, be isolated cases of such occurring, but the general good derived would far out-balance any such. During the late mobilization manœuvres at Portsmouth, the horses of the Yeomanry regiment which I command had to do exceptionally hard work, owing to having to perform troop and regimental drills as well as night and day attacks in connection with the mobilization, and I attribute the good state of these horses' backs, to which Veterinary Captain Smith can testify, to the way the blankets were being constantly shaken out and refolded, and the numnahs reversed.

On one occasion, when out at regimental drill, all the saddles were taken off the horses, every strap and buckle undone, cloaks unrolled, numnahs and blankets detached from saddle and shaken out, and then, for regimental competition for the best turned-out troop, they were put together again by the yeomen themselves on the field, the regiment proceeding as soon as mounted straight to a divisional reconnoitring field day for four or five hours without any casualty occurring.

This, of course, was a much higher test than I advocated when suggesting the advantages of shaking out the blanket only, but I instanced it to show how a much more difficult performance could be got through without harm resulting.

Now, as to the best way of folding a blanket, the best plan is that which is easiest: I have found the plan of folding a blanket 6 ft. square in three equal parts, double it, and then place on numnah,

the best. It can be easiest done by one man, which I will practically illustrate, and, if thus folded, placed on the numnah, the straps of which are buckled up to front and rear of saddle, it is a total impossibility for it to shift or work out behind. The blankets in our cavalry service are, I think, folded differently, so as to have more folds on the side-boards than on the back; this is right in theory, but in practice I notice the extra thickness is inclined to slip down, and so make a ridge under the side-board.

I cannot see how the blankets shown with the foreign saddles are kept in their places. I may be told they never shift, but, on the other hand, I have been told they often shift. The tendency of a blanket when put next to the horse's skin is always to work back, the reason, I believe, being that the lie of the horse's hair is from front to rear, and so causes the blanket to move, on the same principle that an ear of barley will creep up your arm if you put it inside your shirt, but anybody who does not believe me can try the experiment by placing an ordinary blanket on a horse's back and an ordinary plain saddle on it, when, after riding for some time, he will find the blanket gradually disappearing from in front and coming out behind. I know the plan alluded to in the book "Saddles and Sore Backs" of turning back the front bottom corner; this may do very well when the girths are tight, but when they get slack away will go the blanket. I believe the only sure and best plan in every way is not to place the blanket next to the horse, and so keep it out of temptation's way, but between the numnah and the saddle; I have done this, with great success, for the last nine years in my Yeomanry, and our cavalry have adopted it for the last few years.

A blanket is hot on the horse when close to the spine, but with a numnah buckled up in front and rear of the saddle and well hollowed out along the top, there is a channel of air the whole way down the back, and when the horse comes in from work, the spine will be found to be perfectly cool, no matter how the part under the side-boards and flap may be sweating.

If a blanket gets mud or gravel into it, a few shakes when folding will soon get rid of it, and stones naturally tumble out, and if the blanket is wet it will be a little heavier, certainly, but soon dries from the warmth of the horse, and as far as padding goes it is none the worse for being damp.

The following are the sizes and weights of the blankets:—

Austrian	9 ft. by 5 ft.	10 lbs.
Danish	7 „ „ 6 „	5½ „
British	6 „ „ 5 „	5 „
American	8 „ „ 6 „	4 „
Italian	6 „ „ 5 „	3¾ „

Numnah Pannels.

Now I turn to a third means of softening and correcting the fit of a side-board, viz., numnah pannels; these we find in the Belgian and Greek artillery saddles, and they have been tried in our Service too.

I look upon them as unnecessary if you have a stout, thick, serviceable blanket and a good numnah; they may stretch, though their advocates will stoutly deny this, and they, of course, increase weight and expense, and I should not like to trust them alone without a blanket.

Numnah.

The numnah is a rarity in foreign saddlery, appearing only in the Danish, and there in a very exaggerated form; in the Russian it appears in a two-fold form, and there, also, I venture to think they have more of it than necessary.

We have in our Service used the numnah for a long time with very tolerable success, its worst feature being that where much pressure comes constantly in one place it gets greasy and hard; to clean it, the soldier uses his own nails or the curry comb and so destroys the surface and a roughness or hole comes which renders it worse than useless. To obviate this I invented a reversible numnah, so cut that it can be used either side next to the horse or either end to the front; thus there are four ways of wearing it, all equally the same, and if shifted every day it would never get into grease spots; this I have tried now for over eight years with great success; our saddlery equipment authorities adopted the shape, but have sewn the straps on in such a way that the numnah can only be worn one way, thereby entirely frustrating the object and consequently the benefit; the reason being given that the numnah was liable to be torn near the straps. This has always been a possibility with the Government as well as my numnahs, but I have now had the straps sewn on to the felt and the felt itself sewn in a way which will render it untearable even to the strongest dragoon, who will put his whole strength into it with the laudable desire of getting the numnah tightly strapped up into the fork of the saddle. This numnah is fastened in front by the above-mentioned strap over the front arch to a buckle on the saddle, and behind by a similar strap to another buckle attached to the cantle. This ensures the free passage of air between the back and the numnah, and prevents the possibility of the blanket, which is between the numnah and the saddle, shifting back.

Girths.

There is a great and interesting variety in girths. Six saddles have the leather girth, some of which are as hard as a board, 2 have a web girth like plain saddles, 1 has a brown canvas girth, 2 have strong girths, and 1, the Russian, has the most remarkable, viz., two pieces of raw hide about a foot apart, the American a horse-hair girth, and the French a number of pieces of broad webbing.

A good saddle which will stop in its place is not so dependable upon a girth as a bad one; of course plain leather is durable, but it gets precious hard, when it becomes liable to crack. I am inclined to favour the principle of the Russian two raw hide thongs far apart over the tree as well as under the belly. It certainly is most uncommon,

and appears to carry out the principle of wide bearings to a greater extent than any of the others do ; this principle is found in the cowboy saddle. The American horse-hair is bound to be a good one.

Breast-plate and Crupper.

There is nothing very remarkable in the way of breast-plates except in several instances their absence ; where they existed they appeared to be more for ornament than for use, but I do not think it would do for our cavalry to give up their use, as the country over which they are employed at home and abroad embraces many a steep hill where a breast-plate would be found necessary, I could only find one saddle with a crupper, viz., the Greek cavalry, which shows there is a strong feeling against that instrument of torture which, whenever it came into play, used to gall the tail. A saddle can go over the tail, but cannot possibly pass over the head, which argues that the retention of a breast-plate is more necessary than that of a crupper.

Wallets.

In twelve out of fourteen saddles under discussion there are wallets ; the foreign wallets appeared to be all more capacious than the British, except the Russian, which looked like small kit bags.

The Americans and Italians do not appear to use wallets.

One thing I remarked about the foreign wallets was that they all have a buckle and strap to fasten the cover instead of the stud and hole which, when a wallet is packed full, has broken the nail of many a British dragoon in his endeavours to fasten it. I recommend this to notice.

Buckles.

I noticed that nearly all the buckles were either galvanized, black, or brass. We have always had steel buckles in our Service, Life Guards, I believe, excepted. I used brass buckles in my equipment for Yeomanry, and find them serviceable, smart-looking, and easy to clean. I am happy to see they have been introduced into the latest pattern Woolwich saddle, and I hope they may be continued.

Shoe Cases.

Shoe-cases are few in the saddles shown. The Austrians carry one, half under the flap of the saddle ; the French, as I remarked, carry one of a very good shape, and, I think, the Hungarians carry one, but these beside the British were all I could see.

Seat.

Now respecting seats of saddles, this is a very important subject for the man's back as well as for the horse's back.

For the man because a bad seat wearies him out, and renders him useless for all his duties after coming in, for the horse, because it so

much depends upon the way he sits in the saddle whether the greater weight, the man, is evenly distributed on the side-boards.

For choice, I should say to look at, the old Greek post-boy saddle, and the Dutch and French were amongst the most comfortable to sit in, and there were several which looked most uncomfortable.

The majority appear to favour the long cantle behind the saddle; this I have often heard severely criticized by men who do not belong to the mounted branches, and I was very pleased to see that the long cantle was so much favoured by Continental armies. I look upon it as essential, for the following reasons: it assists a man materially in mounting; it is the only possible safe way of keeping whatever is carried behind the saddle off the horse's back, and it helps to keep a man in his saddle in hand-to-hand encounters.

I watched a regiment for some years doing the annual sword competitions, and there were a mixture in the regiment of the wooden-arched saddles with the high cantle, and the iron-arched saddles without any cantle, and I invariably noticed that the man in the former saddle had an advantage over a man in the latter. When it came to a collision, or the horse reared or plunged, or a very rough thrust was made, I have seen a man driven over the hind part of his saddle and succumb over the horse's tail out of a low backed saddle, whereas, under similar circumstances in the high cantled saddle, he would keep his seat. It was very noticeable that when a man was unseated, it was almost invariably out of the saddle without the cantle.

It is difficult to compare the length of seats, as with the high peaks it is not easy to say where the seat begins and where it ends, but the usual lengths from the front of saddles to the hole in the cantle varied between 17 and 18 inches. The length of a saddle must be determined to a certain extent by the way the men are ordered to ride, as if they ride with short stirrups, the seat should be longer than if they ride on their forks with longer stirrups. The danger of a long-seated saddle is that when tired the men will lounge back in their saddles, and so bring all the weight in one place, viz., where the side-board begins to curve up under the hind arch, but in a short seat, the men must sit up.

I noticed that a good many of the saddles had a strong piece of leather stretched from the front to hind arch, to support the seat; this was fastened in most cases by thongs to the side-boards; it seemed in some to make rather a ridge down the centre of the seat, which is very uncomfortable. I decidedly admired the Dutch seat, which appeared to be made of double strips of leather sewn together. The American, of course, was the simplest, as there was little or no seat at all.

Flaps.

Five of the saddles had the flaps and seats combined in one; three saddles had stuffed pads in front, which I should have thought were unnecessary; two had a great amount of leather, viz., the Austrian and Greek artillery; the American none at all; and the Dutch a

very peculiar flap, much broader at the lower part than the top. I certainly think that for comfort and utility saddles like the French, British, and Belgian seemed the best, as far as the flaps were concerned.

Stirrups.

Some of the stirrups looked very heavy, noticeably the Austrian and Greek, but they evidently laid great stress on roughing their stirrups to prevent the foot slipping. The American I have already described.

Saddle Bags.

Five of the saddles carried saddle bags; this, of course, is a very convenient and commodious way of carrying kit, but a Veterinary Surgeon will tell you that, owing to the configuration of the ribs of the horse, weight should not be carried on the place where these bags are always hung; they are certain to make horses sweat a good deal, and they get knocked about very much with close work in the ranks. They may be all very well for a pack horse, which goes along by itself, or in a string at a slow pace; but I should not choose them for cavalry, who have to ride close, and do sharp work.

Carbine Bucket.

It was difficult to discover from the equipments how the carbine was carried, and only in four saddles could I see any rest for it on the saddle, which leads me to suppose that the majority of the foreign cavalry carry the weapon entirely on their back.

In the British it is carried in a long bucket; in the American, in a very short one, both behind the leg; but in the Dutch and Danish, in a very small bucket, in which only the muzzle fits, in front of the leg; this is the way our cavalry carried it about twenty-five years ago, the best illustration of which I have seen in an electioneering squib, in which Lord Salisbury, dressed as a dragoon, is settling his chief political opponent.

As far as the horse is concerned, the best place for the carbine is on the man's back, as it saves the weight of any equipment required to carry it, and the consequent chance of damage to the horse from it; it also prevents the upsetting of the balance of the saddle when the carbine is carried entirely on one side, but it must weary the man very much and interfere with his skill as a swordsman.

Our gallant Chairman is now experimenting on this subject, and has, no doubt, hit on the right principles, viz., that the weight should be divided between the man and the horse, and that the carbine should be so attached to the man that when he is parted from his horse he should not also lose his carbine; this, since the sword has been carried on the saddle, has become all the more necessary, and I trust he will be successful in achieving so desirable an object.

Weights.

The comparison of weights of the various saddles is a very difficult one, as they carried a great variety of equipment, but I made the following comparisons:—

Italian. Saddle, breastplate, girth, sheepskin, stirrups ..	31 lbs.
American. Saddle, carbine bucket, girth, surcingle, stirrups.....	20½
Dutch. Saddle, breastplate, girth, carbine, bucket, wallets, stirrups, straps	25 „
Austrian. Saddle, wallets, girth, surcingle, stirrups, straps, shoe case	30 „
French. Saddle, girth, wallets, stirrup, breastplate, shoe case	30 „
Danish cavalry. Saddle, girth, wallets, surcingle, stirrups	27¼ „
Danish artillery. Saddle, seat, girth, breastplate, stirrups, wallets, strap, carbine bucket	18¾ „
Belgian. This equipment being fully packed, I did not weigh it, as it could not thus be compared to the others.	
German.....	32½ „
Greek artillery. Saddle, wallets, shoe case, breastplate, girth, stirrups	28 „
Greek cavalry. Not weighed.	
Russian. I had not weights enough for this equipment.	
British. Saddle, carbine bucket, wallets, girth, surcingle, shoe case	27 „

From the above weights the Danish artillery would appear to be a very light one, and it certainly has a very strong, if not the strongest, tree shown. It beats even the American in lightness, which has so little on it.

It is of course most desirable that a horse should carry as little as possible; upon that every one is agreed; but, to stand the rough work to which a cavalry saddle must be subjected, it is necessary it should be of strong construction; this means weight. Again, to keep the man in health, to enable him to look after his horse properly, it is also necessary that he should not be separated from a change of clothing and a waterproof sheet, and that he should carry a few articles for looking after his horse and equipment. This also means weight, and must be taken into consideration when trying to reduce weight; without the above necessities the horse will probably suffer more than he would from the extra weight which they entail.

Story of the Saddles.

I find the story of the saddles in England since 1855 is shortly this:—

Commencing with the Nolan pattern wooden arch, a Committee

recommended total abolition of blanket and substitution of pannels; this was, I believe, mainly because the blanket would slip back.

There being complaints of leather seats in India breaking away from the wood, the Principal Superintendent of Stores at Woolwich introduced in 1868 a saddle of which the seat was strapped round the arches instead of riveted, and substituted iron instead of wood arches, which saved cost in manufacture. These were found to be miserably weak, and had to be strengthened from time to time by various patterns, each one costing more than its predecessor, until we have arrived at a tree which costs more than double the original one, which was discarded partly on account of expense. The following are the prices of the tree without leather work:—Nolan, 1855, 14s.; iron arch, 1868, 12s. 6d.; steel, 1890, 30s.; and the price, I believe, is still rising. It is for this reason that I recommend the trial of a tree like the Danish; wood is lighter, cheaper, easier to repair, and stronger than iron; there is lots of beech to be had in England, and if there was a demand for it, it would be kept the necessary time before being used. During the Franco-German war the French suddenly wanted a lot of saddles, and came to England for them; we had been making our saddles of iron, and had no seasoned beech; therefore they had to be made of elm, and were not a success.

I consider we are deeply indebted to Continental military authorities who have been so good as to contribute to such a valuable collection of saddlery as was shown at the Saddlers' Hall. I trust they will gain more by being able to take hints from other countries than they lose by having their own good points copied. To look upon it from a humanitarian point of view, that noble animal, the horse, cannot, I hope, fail to benefit, not only in having his burden lightened, but in having what he is obliged to carry placed on the back in the position most comfortable for him to bear it.

The British Army are also indebted to the Saddlers' Company, who have with such open-handed generosity given them and the public at large the opportunity of seeing all the foreign equipments and comparing them with their own, and I trust that much advantage will accrue from that comparison.

But we should not bolster ourselves up with the idea that everything English is the best, and that nothing is to be gained from the experience of others. To sum up, after a careful inspection of the foreign saddlery, I have come to the conclusion that in the way of arches, side-boards, and seats we have much to learn, and though strongly holding to the method I have advocated of carrying the blanket between a reversible numnah and the saddle (whatever it may be), I am inclined to think we are on the wrong tack still as regards the framework of our saddles, which are expensive and difficult to make, and I should much like to see a combination tried of the best parts of the various equipments, such as arches and side-boards of the Danish artillery, seat of the Dutch, side-boards of the Austrian, and I therefore take this opportunity of entreating our War Office authorities to make an endeavour, through the Foreign Office, to retain in England this valuable collection of saddles, where

they can be seen not only by our own Army, but by representatives of other armies, to the mutual benefit of all concerned.

The End.

Great efforts have been made of late in all our Departments, whether Saddlery, Veterinary, or Regimental, to arrive at a good saddle, and to make it an efficient one, until, I believe, the authorities at the Horse Guards have quite lost patience with the Cavalry Service, and are inclined to fix on any pattern, and order it to be made by the thousand; but we do not, from the Exhibition at the Saddlers' Hall, appear to be the only nation who are trying to improve themselves in this respect, so I trust that after this most important Exhibition a pause may be made to consider whether we are wise or not in the line of saddlery which we are at present pursuing, as now is a very critical time. I cannot find that there is any regulation British pattern at present approved, as I understand there is another even later than the 1890 pattern about to be issued for trial. Gentlemen, the subject which I have had to deal with is a very interesting one to cavalry Officers, and a most important one to the whole Army. Cavalry still are the eyes and ears of an army, and to enable them to perform their duties it is above all things necessary that they should have the very best saddlery equipment which can be provided for them, and I shall feel very proud if any remarks which I have made in drawing attention to the merits and demerits of our neighbours' will lead us in that direction.

The CHAIRMAN : We must all agree that Colonel Crichton was right in saying that this is a subject of the utmost importance to the cavalry. I do not think anyone could have done it more justice than the lecturer. The interest taken in the subject is shown by the presence of so many cavalry Officers, some unfortunately now lost to the Service, men who have studied it equally with Colonel Crichton. I also see some gentlemen present who are experts in saddlery, and who have made the theory of building saddles the subject of their life study. I hope we shall hear some remarks from them, and also from gentlemen in the Veterinary Department of the Service, if they will be good enough to give us their opinions with regard to what has been said.

Major PHILPOTTS, R.A. : I want, with your permission, to say a few words with regard to the Hungarian saddle. It was a saddle sent to the Exhibition from the Royal Artillery Institution at Woolwich. It belonged to the 2nd Guard Uhlan German Cavalry. They call it the Hungarian pattern, but it is not really the Hungarian saddle, it is the German saddle. The seat, instead of being made of raw hide, like the Austrian, is made of ordinary brown leather. It has side bars like the Turkish, and in a great many points it resembles the Turkish saddle. As the lecturer has said, the shoe-pocket is a very excellent arrangement. It is fixed on a vertical slot in the upper part of the shoe-pocket which slips over the D on the tree, and is kept in its place by means of the near-side baggage strap. The cloak is not fixed in the same way that ours is fixed, but with the three baggage straps in rear of the saddle. There is an arrangement for carrying corn—a bag laid across in rear under the cloak. On the near-side stirrup-iron there are two buckets for lances, one on the off side, for dismounted work. The saddle may look heavy, but is not really so, and in use will be found thoroughly workmanlike. The side bar measures 5 inches by 21. The blanket seems most excellent. It is not quite as thick as the Austrian, but is of excellent material, better than our present Government brown blanket; it is much thicker and will wear much better. It is kept in its place by

the front corners being turned over and fastened by means of the girth straps. I believe they do find that it sometimes slips. It measures 7 feet by 7 feet 11 inches, whereas our blanket measures only 5 feet 6 inches by 4 feet 10 inches. It would be most useful for the horse on the picket lines. Our blanket very soon gets worn out, and would not, I fancy, be of much use on a wet night. The pilch is something between the Turkish and the Italian. The stirrup irons certainly look heavy, but they are very similar to our new pattern. The weight of the saddle with one shoe-case, breast-plate, girth, wallets, and surcingle, is 32 lbs. It has one shoe-case on the near side, and on the wallet, on the off side, there is a place for another shoe.

Colonel E. A. WOOD: I only want to make one remark connected with the American saddle. I had a Whitman saddle sent over for me to try in the 10th Hussars in 1884-85. I gave it a thorough trial and was very much gratified with it. There is one point that does not appear in the drawing, namely, that the saddle was supplied with the horse-hair numnah. There was with it a small, square, horse-hair numnah which fitted between the blanket and the saddle. Although there was no breast-plate or crupper, the blanket never moved an inch, and I believe that was simply because it was a horse-hair numnah. I tried afterwards to get the same numnah at the Horse Guards, but I found it was lost. I believe that to be a most important point. The Americans evidently find some advantage in it or they would not use it under the blanket.

Lieutenant-Colonel HUTTON (Commanding Mounted Infantry): Perhaps, first of all, an apology is due from me for taking up this question at all, seeing that I am not a cavalry Officer. I have, however, gone very carefully into the question of saddles for a number of years past. In fact, I went over to America some years ago for the purpose of studying questions in connection with mounted troops and the Whitman saddle, and the American saddle equipment in particular. The whole question of military saddlery must turn upon the weight to be carried on the saddle. I think, before considering the question of military saddles, we should consider really what weight the saddle is to be required to carry. Many foreign nations have adopted saddle bags, whereas this country and several others have retained the old method of carrying the kit and other *impedimenta* upon the top of a heavy saddle or superstructure raised above the horse's back. The first consideration is the weight to be carried on the saddle, and the second, the position in which that weight should be placed. First, as regards the weight. It has been laid down by Professor Smith and other authorities that the weight to be carried should not exceed something between one-fifth and one-sixth of the weight of the horse itself. In the case of an English troop-horse, which weighs about 1,000 lbs., the weight would be about 15 stone. In the case of smaller horses, of which I have personally had considerable experience in different parts of the world, weighing from 800 to 900 lbs., the weight should be from 13 to 14 stone. The weight of the saddle, which Colonel Crichton has given as the English saddle, is stated to be 27 lbs. No authority for this statement is given, and in the only tables we have to go upon of an official kind, published with the Army Orders of 1888, the weight of the regulation saddle is put down at 3 st. 5 lbs. or 47 lbs. By the Cavalry Transport Regulations, the English cavalry soldier rides from 18½ to 22 stone, or from 3 to 4 stone above what any horse should be called upon to carry. The same relative weight by regulation holds good for mounted infantry, who, by regulation, is to ride 19½ stone, or from 6 to 7 stone above what any small horse (Arab, Cape, American, or Irish cob) can carry. Are we, gentlemen, in the future to overweight our horses in this absurd manner? If, as common sense dictates, the weight of a cavalry soldier is to be reduced to 15 or 16 stone by relegating all superfluous kit and paraphernalia to the baggage wagon or pack-horse, surely it will be unnecessary then to place 47 lbs. of saddle and saddle equipment on the horse's back. Secondly, as regards the position of the weight on the horse's back, I know that most authorities agree on the necessity of the man's body and all dead weight being brought as low upon the horse as possible. This object is best met by the American saddle, an adaptation to which has been proposed by myself and strongly advocated by several Officers high in authority, the weight of the man's body is, with this saddle, actually upon the horse itself, and is not raised upon a tree or super-

structure as in the case of most other military saddles. Oscillation is obviated by this means, and a much lighter saddle can be used, which, however, should, of necessity, have a saddle bag to carry any extra kit or *impedimenta*. I know of no description of military saddle which better meets the necessity of lightness, cheapness, and durability than the American saddle. The lecturer alluded to the wooden tree of the American pattern saddle and to the possibility of its being broken or getting out of order. This is, no doubt, a difficulty; but the Whitman Company, who make for the American Government, shrink hide over the whole wooden tree, and that to a very large extent strengthens it. The lecturer also referred to the material for making trees, viz., wood or iron. To a great extent the material depends upon the climate in which the saddle is going to be used. If it is to be used in a country where there are great changes of temperature, the iron tree is not advisable, because the changes of excessive heat and cold cause the metal to expand and contract, and that is one reason why the Americans have adopted wooden trees. With reference to the Belgian saddle, which Colonel Crichton has specially brought to our notice. It is worthy of remark that the Belgian soldier rides from 14½ to 15 stone, and that he is the lightest equipped cavalry soldier in Europe. Colonel Crichton referred also to the length of the side-bar. The length of the side-bar must depend entirely on the length of the back of the horse. American horses, like our own colonial breeds, are short in the back, therefore the side-bars can be made proportionately short. Colonel Crichton also referred to numnahs. My experience in different parts of the world on active service convinces me that it is practically impossible to keep any description of numnah in a serviceable condition. It picks up mud, dirt, and sweat from the horse's back, and, after a time, no matter what pains and trouble are taken, the numnah will get hard, and so perfectly useless. As far as blankets are concerned, I am fully convinced that Colonel Crichton's views are sound in respect to the advantage of having a blanket with a numnah to begin your campaign with. The numnah, after a short time, must become unserviceable and you can then fall back upon your blanket, but if you start with a blanket alone, its texture gets thin sooner and it suffers in proportion. With reference to saddle bags, Colonel Crichton pointed out that the great drawback is that they are carried on that part of the horse which is the weakest. This, no doubt, is the case with the patterns which he has brought before your notice to-day, except that of the American Government, and this defect is conspicuous in the case of the Italian saddle equipment. In this instance the whole weight of the saddle bag in which the kit is carried hangs over upon the short ribs of the horse, which is the weakest part of the horse's back. The saddle bag which the American cavalry use, and an adaptation of which has been strongly advocated, hangs below the rider, practically in a line with the 14th vertebra, the centre of gravity of the horse, and rather in front of it. With regard to the carriage of the rifle or carbine: this is a subject upon which much controversy exists among Officers of great experience in campaigning. My own experience is that it is impossible to carry the present magazine rifle, weighing 11½ lbs., upon the saddle. It is not practicable to balance so great a dead weight. This argument must hold good also as regards a magazine carbine. The carbine as it is now carried can be balanced at starting by the 8 lbs. of corn, on the near side, but as the corn is consumed so is the balance of the saddle destroyed. The rifle, and I venture to think also the carbine, must be carried on the man's back. I know that some Officers hold that the physique of men campaigning will not stand the weight of a rifle for any length of time. I have always found that it is a mere question of habit, and that men get wonderfully soon accustomed to the weight. To give an instance, during last autumn, with men comparatively untrained and little used to campaigning, it fell to my lot to march 70 miles in sixteen hours in order to test this very point. The magazine rifles (11 lbs. dead weight) were slung over the men's backs, by means of a broad buff sling attached to the rifle by adjustable metal fastenings. The men, after marching 57 miles, were halted for a quarter of an hour or twenty minutes to gruel the horses. Though the men were allowed to take off their rifles if they wished, not one availed himself of the permission. The march was then completed, and the men complained in no way of the weight of the rifles, either upon that night or the following morning. We can only hope that this

interesting lecture to which we have listened may pave the way to a reduction of the weight to be carried by mounted troops and to the provision of a light and durable saddle and saddle equipment, upon the lines, perhaps, of that in use by the American cavalry.

Veterinary Captain SMITH : I am sure we are all exceedingly obliged to Colonel Crichton for putting this matter before us in the way he has done ; his lecture has prevented these foreign saddles being entirely lost to us. The point, I take it, is simply, what have we got to learn from an examination of this saddlery, and how far can the good points be applied to our own particular purposes? I hold that it is utterly impossible by a mere examination of the equipment to settle what points are likely to be of any service to us, unless, as the lecturer pointed out, the whole thing be put to a very thorough test. I am afraid we have not hitherto given our saddlery equipment that severe trial which it certainly needs, in order to settle the best type of saddle to be adopted. It is certainly absolutely necessary that no important article of saddlery equipment should be adopted unless it has undergone at least a 200 or 300 mile march under trying conditions. I cannot think, however, from the little I know of the subject, that this collection can be taken as representing the patterns of saddles which exist on the Continent. Unfortunately the German saddles are not represented at all. I believe they have at least three or four different types of saddle, which it would have been very interesting to us to have learned something about. The French also have three or four types, and certainly the drawing of the English saddle does not represent the sole type of saddle used in our Service at the present day. On this point I may say that Colonel Crichton has referred to the horse, covered over with sores, which figures in my "Manual." Of course, I did not mean to say, for one moment, that any one horse ever presented so many injuries on his back ; but I may add that the saddle which is capable of producing those injuries exists at the present day in exactly the same way as it existed at the time I wrote that pamphlet.¹ Colonel Crichton refers to the "points" of the saddle. The object of the points was to prevent the saddle from turning when a man mounted in a hurry. You find exactly the same "points" in some saddles of the armour period, which run not only from the front arch, but also from the rear arch, extending some considerable distance below the rib. Referring to the fit of the side bar, I may say that it is as necessary that it should fit as accurately in its depth from top to bottom as in its length from front to rear ; but, owing to the fact that the curve of the side-bars from top to bottom is shorter than in their length, it does not appear to be so important. The Austrian steel side-bar does adapt itself, not only to the varying shape of the back in its width, but it also adjusts itself to the curves from front to rear. Perhaps, however (and here my opinion is opposed to that of the lecturer), the important point in the lecture, so far as the Service is concerned, is the question of pannels *versus* blankets. There is fashion in everything ; and, at the present day, the fashion in saddlery is the blanket. But I hold, that so long as we have our saddles made up with rigid, unyielding side-boards, that it would be almost impossible to expect our backs to be kept in a perfectly satisfactory state, if we simply have a blanket placed beneath the saddle. Let me say why I believe the pannels to be superior to the blanket. The explanation is this : the hair in the pannel has a tendency to shift, and to adjust itself in such a way that a side-board, which does not perfectly fit the horse, is made by the adjustment of the hair in the pannel to fit him fairly well ; I do not say to fit him as well as the Austrian automatic tree—very far from it ; but certainly it fits him better than a blanket folded in a certain number of folds, equal in thickness from front to rear. I conceive, therefore, if we have to use the rigid side-board, the hair-stuffed pannel beneath the saddle is essential. How is it, however, that pannels have been brought into disrepute? Simply for the reason that we reduced the amount of hair in the pannel from 3 lbs. to 1 lb. 4 oz. ; and when we reduced the pannels to that extent we rendered them practically useless. You might just as well put a certain number of sheets of brown paper beneath the saddle, for they would have done equally well. If we place more hair in our pannels—if we come back to the original 3 lbs., we might use the unyielding side-board, and have a fair amount of

¹ The lecturer's remarks would lead one to believe otherwise.

success, whatever length of campaign we were called upon to undertake. Another advantage in the pannel (and I find the lecturer did not think very highly of it) is the chambering which a pannel can undergo, and which, of course, you cannot possibly apply to the blanket. You can chamber your pannel in such a way—and I speak with a certain amount of experience on this subject—that you may work your horse without any danger of the sore back getting worse. That is a most valuable circumstance, and one which should not be lost sight of. At the same time, I am a firm believer in the use of the blanket to make good the condition which the horse has lost. There can be no doubt that a good blanket will be essential in future. We cannot possibly discuss this question of saddles apart from the horse. What is the use of saddles? The use of the saddle, in the first instance, is increased comfort to the rider; but it is something very much more than this. The next use is to distribute over the horse's back the weight which he has to carry. We could easily distribute this weight if all parts of the back were capable of bearing pressure; but we know perfectly well that there are certain parts of the back which are not capable of bearing weight. There are some parts that we must be most careful to avoid. Still, the distribution of weight may be readily carried out, in spite of this fact, if on all parts of the back the pressure could be imparted in the same particular way. We know it cannot. The pressure you put upon the back behind is totally different from the pressure in front. In other words, the pressure on the rear arches is totally different from the pressure on the front arches. It seems to me that even these difficulties might be overcome if all horses had the same size and shape of back; but they have not. But the most serious difficulty of the whole lot is, that when horses are undergoing severe and violent work, their backs are changing in shape. The muscles which were plump and full before they left barracks have now commenced to become wasted; they get hollow, and we have from the shoulder to the loins a huge gutter formed. Practically, from the saddlery point of view, the muscle on a horse's back simply represents so much stuffing, the object of which is to prevent the ribs from getting bruised: for the horse does not carry the weight upon the back, but upon the ribs; and, since we have a loss of flesh upon the ribs, obviously the more the weight of the saddle and man is brought upon the horse, and injury results. Therefore, this constant alteration in the shape of the horse's back, as the result of work, tells us that we must have a tree which will adjust itself, in order that the side-bars may lie evenly on the back. That is a very important point in the Austrian steel-fitting tree, where, to bring it about, we have a certain number of hinges introduced in a most ingenious manner. I can speak from experience on this subject, because General Keith Fraser has permitted me to try the saddle for some considerable time. I have had it on a large number of horses, and have never found a horse yet that it could not fit. With our own Service saddle, the difficulty is to find a horse that will fit into it; with the Austrian saddle the reverse is the case. It automatically adjusts itself to the varying shape of the horse's back. The side-bars open or close, depending upon the size of the muscles of the back; and, therefore, we always have the weight distributed equally from front to rear, and from top to bottom. With this kind of tree you can place your blanket underneath of the same thickness throughout, and you have your man's weight equally distributed; but, until we have got a self-fitting tree, I hold that we will find it necessary, when we call upon our horses to perform anything like severe work, to have good pannels on the saddle and a good blanket beneath them.

Veterinary Colonel LAMBERT: I wish to make a few brief remarks with reference to the saddle-tree. I happened to see a copy of an original Moorish saddle and a Mexican saddle, also of an old Spanish saddle, all, of course, derived from the Moors. It was rather a remarkable thing to notice how, in the whole of those, the original saddle-tree used long before the Mahommedan era by Oriental nations is still retained. It is the parent of our military saddle trees, and, though called the Hungarian, was for ages employed before the Hungarian nation came into recognized existence. I have had great experience with the blanket on service. It was extensively used in the Zulu campaign by the 17th Lancers, of which regiment I was the Veterinary Officer. I do not know how we could have got on without the blanket. We had the numnah, but we also had a very large thick

blanket. It weighed about 8 lbs., and was of a fawn colour. We found it a very great success. There is one advantage of the blanket as to which I do not quite agree with Professor Smith regarding its merits as compared with panels, and that is, we found that if you have an abrasion or a slight sore, with a blanket you can often still go on working the horse, and very frequently it does not appear to get any worse from any chafing by the blanket. With a pannel, however, it is different. You cannot on service conveniently chamber the pannel, and the horse will therefore only get worse. We know that horses on a campaign, if they are not properly foraged and are hard worked, lose flesh rapidly, and then their saddles will not fit. No thickness of pannels would obviate that, and, besides, you would not have in the field the means of readjusting the pannels so as to fit. You could, however, fold a blanket as you like. The blanket has been tried in earlier wars, as will be seen by an extract from a book published by General George Hanger in 1814, in which he said, "In the British Legion in America we had no sore backs. Our blanket, six or eight times doubled, was always laid between the horse's back and the saddle. If our cavalry on service could have a blanket eight times doubled under the saddle it would be of great utility, and you will never have a horse with a sore back." No doubt he exaggerates in saying "never," because you are certain to get sore backs, however careful you are. A great deal depends, of course, upon the work which has to be done. With regard to the numnah, as has been said this afternoon, it gets out of order, and, in the 17th Lancers, in Zululand, we found that it did so very often. When this occurred the numnah was discarded, and the blanket was used alone. Of course it seems quite a minor point as to what the colour of the blanket should be. In the artillery, in Natal and Zululand, for instance, a white blanket was used. We find that a good many foreign nations use a white blanket, and the reason is this. If you have a dark-coloured blanket, the dark colour allows of the fraudulent employment of inferior material, which is, however, easily detected in a white blanket. The blanket must be of good substance, a flimsy light one is a very great mistake. It has always struck me as disadvantageous to send a saddle right away to be tried by regiments, because every regiment tries a saddle in a different way, and very often from different points of view. I think it would be well for any Saddlery Committee to have all trials made within its easy reach, so that its members might go at least once a week to see how matters were going on, a most important point.

Mr. BYWATER: I have listened with great interest to this lecture. Amongst the important subjects dealt with is one illustrated very forcibly by the diagrams. One is struck by the diversity of the shapes of the seats of these saddles, and it is a fact that the position in which the soldier should sit has never yet been satisfactorily defined. There are a great many opinions as to whether the riding on the fork or the adoption of a hunting seat, or something approaching to it, is the more correct. Certainly for the saddler it is a most important point, because, unless he knows what is required, he is utterly at sea as to what to construct. Now the Danish saddle is as straight as the Dutch is deep, and I should say of these two the Dutch is the better. There is no doubt that, fifty years ago, there were fewer sore backs in the hunting field than there are now, simply because the hunting saddle of those days was deep and broad, and the rider sat very much towards the centre of the saddle, whereas with a very flat seat, such as the public now generally desire, the rider sits anywhere. With regard to the saddle which has been made for General Fraser, I may add that the bars to a certain extent have an elasticity, which enables them to conform to the shape of the back longitudinally, as well as adjusting to the grip. I do not know that I have anything else to remark, except that it will be a very happy day when the position of the rider is definitely decided.

Major-General MONTGOMERY-MOORE: I should like to mention a saddle that I saw years ago in Algeria, of which I have never seen the principle put forward since. The saddle itself, on which the man sat, was like an arm-chair. The numnahs underneath were six square pieces of cloth fastened together. I have marched many hundred miles with a Spahi there, and the Spahi sits in this saddle like a little arm-chair with a back. He can sit in as many positions as a man could sit in an arm-chair. Of course he has only himself to carry. The principle of the

six pieces of thick cloth, which were all of different colours, underneath the saddle, struck me as an extremely useful one. The Spahi marches longer distances than any cavalry on this side of the Atlantic. He thinks nothing of turning round in the saddle and galloping off, and he will go on in a sort of canter for 100 miles. I think if, instead of either the numnah or the blanket, the separate pieces of cloth could be tried, they might be found an advantage. You can transpose the pieces next the horse's back one after another, so that if one gets hard or wet you simply change it for another. In the long distances I have marched with them I was very much struck with their great suitability for our saddles. With regard to what Colonel Hutton was saying about the rifle being carried over the shoulder; I have marched with the Chasseur d'Afrique, and it certainly struck me as one of the most clumsy arrangements possible at first, but, after marching long distances and talking to the men about it, the comfort that they found it, just dropping the right end behind and adjusting the butt, they say they would infinitely rather have it than carry it in any bucket whatever, and at the end of a long march the discomfort felt from the carbine seems almost infinitesimal. One has tried it one's self shooting, and in going into jungle: I have always preferred carrying the rifle slung across the shoulder; it is much more convenient, and can be got at very much more easily. What was mentioned by Professor Smith is one of the most important points, viz., the reduction of the condition of the horse, and that no saddle that does not allow for that as a first principle should be considered at all. That, I understand the lecturer, is considered in the Dutch saddle. That, no doubt, is very important. Then, looking at the seats, I think the cowboy saddle gives you the idea of the most comfortable seat of the lot. The flap mentioned by Colonel Crichton is well worth trying. You get rid of weight: it moves with the leg, and seems just the thing you want for the saddle, although to the eye of the cavalryman, perhaps, it is not very ornamental.

Major J. HORTON: General Fraser and Gentlemen, I have been following the saddlery question for the last thirty years, and I am well acquainted with what the Committees have done during later years. The American pattern saddle spoken of has been brought prominently before the Services from time to time. It has its advocates and opponents; one disadvantage, it will not carry the kit as the Service at present consider it should be carried. Before we make a saddle we should first determine the maximum weight to be carried on it, whether it is to carry 22 or 23 stone or more. And as it is the arches of the saddle that carry the weight, and as we find if a saddle gives way it invariably gives at the front arch, we must consider and determine suitably that point first. The latest pattern front arch will stand a dead pressure of 8 cwt. The saddle I see on the chair is a Nolan modified saddle, a wooden saddle, well known in the Service; it is about the best military saddle we ever had, but it would need altering to suit present requirements. We have had several patterns of saddles while other nations have been contented with one. The French saddle now shown was in use in the French Army sixteen years ago. We fail because we will go in for lightness in the wrong place. We seem to act upon the principle of building a house and allowing the foundations to be weakened while story upon story was being added.¹ We must begin with the foundation of the saddle, which is the saddle-tree; we can then add weight, but with some limit. We have a Service saddle which will only stand 4 cwt. strain on the front arch. Some one determined, until higher authorities interfered, that it should carry pickaxe and shovel and all kinds of *impedimenta* in one bag, and they were to be hung on the arch; and this weight on the saddle was to be in addition to the marching order kit and the weight of a non-commissioned officer,

¹ I saw a saddle to-day that illustrates the point. A would-be inventor has taken a Service angle iron arch saddle-tree, which is already too weak, yielding at a pressure 2 cwt. below what is now considered a suitable strain; and he has cut away the metal of the front arch by a series of slots, reducing its strength in consequence by 1 cwt. At the same time he has added excessively heavy iron staples and plates to the side-bars, quite double the thickness and weight necessary for the purpose intended. He has added weight where it was not required, and taken away weight where it was absolutely necessary for the maintenance of strength in the vital part of the saddle-tree.—J. H.

who would in all probability be 14 stone. We must remember that anything above 11 stone, which is calculated as the approximate weight of the rider, must be put on the saddle as extra weight to all that is laid down in the Regulations. I knew one very stout farrier sergeant who was about 16 stone weight without accoutrements. After seeing a poor horse work in marching order under him one field-day, I obtained the Colonel's permission to inform him privately he was in future to put nothing on the saddle in his valise and wallets but straw. He was to appear only outwardly to be all right. The American saddle tried lately is not so strong as the one that was in the Exhibition, and which is the American Army saddle. One American pattern tried for rank and file was an Officer's saddle, and a very light saddle too. At the American Exhibition a few years ago I picked up the Whitman saddle, and said to the agent, who had all kinds of American saddles on sale, "This is a very light saddle." He said, "Yes; but none of the ranch men will buy the Ranch saddles from us unless they are 40 lbs. in weight. Ingenious people sometimes say, "Here is a light saddle for the British Army;" but on examination of the article it is found the straps and parts are flimsy and unsuited to last one half the time they would be expected to. A saddle must have sufficient strength to last a reasonable number of years, which means a certain addition to weight. I had a bit the other day that was 6 ozs. lighter than when it was first issued, owing to constant wear and cleaning, so that it seems to me that if everything is to be issued on the very lightest principle they will only last about one-third of the time that they are supposed to do at present, which will very materially increase expense. In reference to girths and their attachment, if we examine old prints of the last century, from plates by Wouverman and others, we shall find that the girths are shown attached to the front of the saddle. After that time we get back to central girthing. The seat in that case was very short; the man had to sit right in the middle of the saddle, almost straight legged. One gentleman who spoke just now said, "The seat should be defined," or, who is going to define the seat? I say the seat is strictly defined, and a very good seat it is: and if we ride according to the definition given in the Regulations we shall ride in the saddle in a manner that it will well suit. The Hungarian saddle is similar to the Austrian, only the one has a shabraque shown and the other has not. I went carefully through these saddles when they were at the Exhibition, some of which I well knew. The whole of the foreign saddles in possession of the Government I believe came before the Saddlery Committee some years ago. One thing should be particularly noted, mostly all the saddles shown on the diagrams are worn with more stuffing or padding than we have been lately using. The Russian saddle depicted is a new saddle, but there is another new saddle for the Russian Army somewhere. I was struck with the very pretty way this particular set was got up. The smell of Russia leather which it had is given to it by a special preparation of oil. The Russian Service black harness and saddlery is similarly prepared. With regard to the principle of the blanket and pannels, if you put five people to decide upon this point I am sure you will never get five of one mind. The great cause of all the trouble of the past has been that we rather exaggerate when we have to do anything. Some nine years ago the attention of the authorities was called to the fact that the saddlers, to save themselves trouble, instead of taking out the old stuffing, which was excessive, and restuffing the pannel, used to put a little fresh hair on the top, while the old stuffing was left as hard as a door mat. The consequence was, those who looked after regiments pointed out that the pannels wanted a little less stuffing, and that properly put in. I am bound to say, from all I saw and know of recent events connected with saddlery made public, that the faults were exaggerated, and that actual faults were caused by not having sufficient stuffing in the pannels. I will take the very worst pattern universal saddle we have, and use it on any horse in England up to my own weight without a sore back. I have seen 300 horses of a regiment march 200 miles all with these "bad saddles" on, and there was but one sore back; 150 of the horses were young, and had joined after the return of the regiment in question from Egypt. The one sore back was that of the drum horse. The pattern saddle was nevertheless faulty; it was not by any means a good saddle. And now as to pannel, numnah, and blanket. I do not care which you have; the great difficulty is none will agree (I am

afraid, although wanted, if hair pannels are not used) to have all three. If you have a properly stuffed pannel and a blanket you ought to go anywhere; there is not the slightest doubt about it; but the objection is, the hair pannel requires a skilled tradesman to adjust it. My opinion is, after seeing nearly the whole of the trials and carrying many out, that you want an underlining to your side-bar, so that you can adapt them, without an artificer, to meet the longitudinal differences of horses' backs, and you want your blanket for the use that Colonel Crichton has so well put before us. Personally I prefer the numnah underlining, similar to the new saddle which General Fraser advocates. You may call it an underlining or, what it is best known by, a numnah pannel. It is the best thing you can have for the purpose. It will not get stiff unless thoroughly neglected or clotted with oil and dirt other than from the horse. I inspect hundreds of numnahs returned from regiments, and I do not find six hard ones to a hundred soft. The numnah is of woollen felt, and should it get hard you have only to roll it up and rub it in your hands as I do now, and it will get soft enough. You may use your blanket without a numnah underneath the numnah pannel if you like, as the numnah has more cohesion to the blanket than has the smooth side-boards. At Aldershot ten years ago we had for trial under the saddle 150 blankets. A General Officer carried out the trial. I saw these blankets under the saddle daily before they went to the field and when they came in. We turned the front of the blankets back to catch under the front of the saddle bars; but the blankets did not work back in some cases. I may tell you it depended upon the pattern of the saddle used. We carried the plan out very well with the wooden saddle, as the wallet staple does not entirely cover the front point of side-bar, but when saddles with a point plate and wallet staples on the extreme end of the bar were tried, we were not able to get the blanket to grip. The blankets as padding answered very well, but the heavier the blanket the more the horse sweated, and we found that the horses which carried the heavy blankets were a quarter of an hour or twenty minutes longer being dried and groomed than the horses which had lighter blankets or that had worn hair pannels. The benefit of having a numnah pannel with a blanket is, that as the blanket fills up nearly the whole channel of the front arch, you may with the pannels build up the arch to suit a horse with extreme high withers. It is said you may fold the blanket in various ways to meet this difficulty: granted, but you cannot stand over every man and tell him what he should do, and if you did tell an individual you cannot see when the cloak and kit are attached whether it has been done or not. The fact is you want something along the bar that will allow you to build up an arch for those horses which require a very high arch, about 5 per cent., and that the safety in other cases may not entirely depend upon the accidental folding of the blanket. If not it will result in having to make high arches for every horse, and that will be a great evil, and because we have been working back for years from the high arch to the low arch. A few words in reference to the felt numnah question. Fifteen years ago Colonel Crichton strongly advocated that the numnah should be of leather; I advocated felt, as the said leather numnah smoothed over the inequalities of the animal's back, making it like a mahogany table, giving no grip for the saddle. There were also other reasons. This felt numnah Colonel Crichton now advocates was well tried, but he has changed the pattern several times since; the fault found on trial was that the stitching broke away by the bending and reversing every other day. It is not, in consequence, so serviceable as the other pattern. The self-adjusting bar saddle is not novel; the Danish and Belgian saddles have the same principle; it has been before the public in different shapes for many years. It is a good principle. One patentee has shown an adjustable bar longitudinally, made of thin flexible steel. If you dropped the saddle on the floor the bar would probably take a bend, a permanent set, that would not perhaps be seen, and which would, when in use, prove injurious. Colonel Crichton is a great advocate for brass buckles, as we all are, because they are so much easier to clean than iron ones. I have always advocated the wood arch saddle, as the iron or steel arch is always so liable to be bent by accident; the wood arch saddle is not so liable; it stands a great deal of throwing about. I have seen them in use during the last thirty-two years, and pass many for repairs daily. In the regi-

ment I had the honour of serving in, the Colonel considered them excellent saddles, and with his permission we hung on to them, and repaired them year after year, until there was not a repairable part left.

The CHAIRMAN (General Keith Fraser) : Gentlemen, in the winter of this year, at a lecture in Dublin, Lord Wolseley stated that it was not at all creditable to the Service, and especially to the mounted branches, that we had never been able to invent a thoroughly good and practical saddle. I must say I think what we have heard to-day, the opinions we have heard on the varicus saddles on the walls, the pictures of which we see, and the presence of so many Officers and gentlemen of various trades and professions, shows that this subject has not escaped attention, and if the cavalry have done wrong we share the blame in very good company. For hundreds of years cavalry soldiers have been trying to get a perfect saddle, and I do not suppose in 100 years to come we shall even get it. I even very much doubt whether the boot of the infantry soldier will ever be perfect, nor, I believe, is the best description of repeating rifle quite settled yet. The boot of the infantry soldier has to fit one animal, but the tree of the saddle has to fit two animals, the horse and the man. If it does not fit both it won't do ; it will ruin the horse at all events. If you do not get a good seat for the rider ; if you do not get well-fitting short side-bars, and arches that do not spread, you will injure the horse, there is no doubt about that. It is not so much the fault of the cavalry Officer in our Service, for a study of the Reports of Committees on Saddles for a great number of years will show that there are very few of the opinions of cavalry Officers that have ever been acted upon. All sorts of Officers of other branches of the Service have given their opinion, and the decisions have generally been based on economical reasons, or on somebody's fanciful views on this thing and the other. The wooden saddle was given up because it was recommended as being cheaper to have the iron saddle. Another reason given was, that some of the rivets of the seats had become detached from the wooden cantle. Wooden saddles were used for hundreds of years in many countries, and up to this day in almost all European armies. The Hungarian saddle (on the lines of which the old English saddle was built) is generally admitted to be the best. One reason was, that it was extremely simple. It used to be a wooden tree and plain wood side-bars, and the seat could be laced up in front to let down behind, so as to place the man in its centre. The old English Hussar saddle gave a man an excellent seat. It was a very simple saddle, and it was an unfortunat day when we began to change. That saddle went all through the hot weather campaigns of the Indian Mutiny. Someone has said rightly, the iron arches would not stand the great heat and cold of America. In the burning climate of India the wooden-arch saddle went well through the whole of the Indian Mutiny, and the number of sore backs was excessively small. Since that we have had every description of iron. We have tried everything. The experts at Woolwich told us the flat iron could not spread, but in two or three years our cavalry suffered terribly from sore backs and girth galls, owing to the arches having spread. Then the angle iron arch was brought in, and expert evidence was given that it was quite impossible that *that* could spread. The question was asked, "Did not you say the same thing about the flat iron arch?" "Yes, but this *cannot* spread." Now we all know the angle iron arch does spread. And now we have the steel arch, and even the steel arch has spread, but not much, as it has not been used very long. It is true that a certain number of saddles with the flat iron arch, the one that has given all those sores which Professor Smith has graphically described in his little book, is still in the Service, but it is at last going to be called in. The angle iron arch saddle is being strengthened with a steel bar, and that I hope will keep it from spreading any more. All metal arches will spread in time, I feel quite sure, and my opinion is shared by people of much greater knowledge than myself. One of the most important of the questions raised to-day is the seat of the soldier on the horse. I was very glad to hear Mr. Bywater draw particular attention to that. It is utterly impossible that the saddle shall remain to fit the horse if the man does not sit properly—if there is not a good seat for the man. He said nobody ever had decided what the seat of the man should be. I think there is not a bad description of the proper seat written a long time ago by Xenophon himself in his admirable "Treatise on

Horsemanship." He says: "We do not like that the man should sit as if he were on a carriage seat, but as if he were standing upright with his legs somewhat apart, for thus he would cling more firmly to the horse with his thighs, and, keeping himself erect, will be able to strike a blow on horseback with greater force. It is necessary to allow the leg, as well as the foot, to hang loose from the knee." I think that is a perfect description of a seat. You will see the cowboys at Buffalo Bill's sitting right down in the saddle, and they can pick up things off the ground, which a man cannot do with his knees tucked up to his nose. In the French saddle, in the '59 campaign, the men sat far back, almost on the cantle of the saddle; the result was countless sore backs. You cannot sit on the back of the saddle without pushing the saddle forward, and getting sore backs and girth galls; girth galls really are unknown in the Austro-Hungarian army. I am happy to say they are very rare (owing to the immense care taken) in our own Army, still we have a few, and if you look at the English cavalry riding on these old saddles you will find it is quite impossible that they should sit anywhere except on the back of the saddle, and that they must keep on pushing it forward. As long as the lowest part of the saddle is quite over the centre of the girth then the man sits in the centre of the saddle, and the saddle must be placed over the centre of gravity of the horse. The man feels much less movement. With regard to what is the proper seat of the cavalry soldier, I do not think there can be any question. With regard to the pannels or blankets, there are a great number of differences of opinion. I think the chambering of a pannel is a risky thing, and you cannot get men always on the spot to do it. I know even at manœuvres you will see the saddlers at work all night, trying to tease and chamber the stuffing of the saddles. On service you may not have men capable of doing that, whereas the blanket can always be altered to fit. In the American War a Confederate General commanding the cavalry said no saddle with pannels would do; the saddles he liked best were the McClellan saddles, which they took from the Northerners. Nobody sits more down in the saddle than a jockey. That is the seat you ought to have; the man should sit down so that he can ride about 4 inches from the saddle. Some of these saddles we know something about. The American saddle is, I believe, most comfortable; it sits the man right down in the saddle, and gives him a very firm seat. I am quite sure no hunting saddle would do for the cavalry soldier. Colonel Denison, the author of "Modern Cavalry," who is not at all a cavalry soldier, and not at all infatuated with the idea of cavalry, for he was the first advocate for the creation of mounted infantry in our service, but who has seen a great deal of mounted work, when he was commanding a detachment of his own troops on the frontier, in 1866, had some of the Hussar saddles, but not enough. He found that the greater number of horses that had an ordinary hunting saddle were almost immediately laid up, and not a single horse with a Hussar saddle had a sore back! He is clearly of opinion that the hunting saddle does not suit the cavalry soldier. The Austrian saddle is a much deeper saddle than any of our present ones. The wallets hold the men's kit, and behind the saddle he carries two days' corn and his cloak. I heard it remarked that the English cavalry was so heavy. I should like to see a comparison of the Hungarian cavalry and the English. The Hungarian Hussar horse carries 22 stone, and several men in each squadron carry large pioneer tools, spade, pick, and all those sort of things. They go out early in the morning, and come in late at night during manœuvres, and the next morning they come out fresh, and go on all day again. They happen to be very hardy horses. I do not mean to say that the English cavalry horses could not do it at all. Our cavalry horses do not, in marching order, carry more than 18 stone, and you may take the men at 11 to 12 stone. I do not think when they went to Egypt the weight even was so heavy as 18 stone. We are nothing like as heavy as most foreign cavalry, though we should all like to reduce the weight. With regard to the saddle-trec invented by Mr. Wilhelmy, of Vienna, made up for me with the jointed side-bars by Messrs. Wilkinson, it is not the least like the Danish tree, or at all on the same principle. I did not think of sending it to England till I found 500 Officers had bought it themselves to take to Galicia, at a time when war appeared imminent. I thought there must be something good in it then. The Austrian cavalry tried it

severely in one or two regiments, with horses given to sore backs, and just before I came away in 1890, a considerable number more saddles were ordered by the Government. I have one here which has gone through every description of experience; amongst others, it found its way once to Woolwich Museum of Curiosities, having been lost during its practical trial in this country. It went through a round of trials; it has been ridden in by very heavy men, by Scots Greys, Life Guardsmen, as well as by Hussars, for the last three or four years, and has answered very well. There is another saddle that has been in the Exhibition, which Colonel Brocklehurst, of the Blues, has been building and using, also without a flap. The principle of the saddle is that if the horse is hollow backed, and the man sinks down, instead of having to stuff the pannels, as they used to, or folding the blanket over, so as to raise the saddle at the back, he slips in a pad of felt, and raises the man; or if the horse is very low in front, he puts the pad in under the front, so that it fits the man to the saddle. This has answered very well; the men like riding on a blanket much better than on the flaps; it gives them a much firmer, closer seat. We have also here a tree which has been made by an Officer of the 14th Hussars for a special horse, which he could not fit in any other way, and I believe it has answered admirably. It has had very broad side-bars. With regard to carrying the carbine on the body or not is a question that affects the saddle, because it upsets the balance at present of the saddle so terribly; anybody who has travelled much with muleteers and drivers of pack animals knows that they add great stones to one side rather than have the balance wrong. We put the weight of the carbine all on one side, and then we expect the horse not to get a sore back. I always have been an advocate for the cavalry soldier having some arm on him. It would be a terrible thing if he was to get down and be left behind as he is at present equipped, without a sword or a carbine, or even his water bottle. I have never seen any foreign cavalry who minded carrying the carbine across the back. The Aden Troop, a magnificent body of cavalry, used to carry the carbine on the body, with the muzzle down, resting, when they wished it to do so, in a small bucket on the saddle; the men did not have to pass the sling over the head to shoot: they could put it up to the shoulder, and could fire at once. I was particularly struck by it, and I have been trying ever since I saw it to get something of the kind, because after that terrible disaster which happened in Afghanistan to the 9th Lancers, owing to the carbines being on the saddles, I thought it was absolutely necessary that the men should have a firearm on their bodies in future. I am very glad to see the great interest that has been taken in this subject, and I hope the "Saddlery Exhibition," for which we are indebted so much to the Saddlers' Company, will make people pay more attention to the question of cavalry saddles. Oliver Cromwell, the finest cavalry soldier we ever had, "perhaps the finest the world ever saw," as he is described by a celebrated German military writer, said, "Let the saddler see to the horse gear. I hear many are ill served. If a man has not good weapons, horse, and harness, he is as nought." That is absolutely true now as it was then. I will now ask Colonel Crichton to reply to various questions that have been raised, if he should wish to do so.

Colonel CRICHTON: I have not been asked many questions, but I should like to say one or two things. I am very sorry we are not able to have the foreign saddles themselves here instead of only my pictures of them; but I asked the Clerk of Saddlers' Hall if he would allow us to have the saddles. He said he could not do so, because it would be a breach of faith with those Governments from whom the saddles were received. I was glad to hear Major Philpotts allow that the blanket slips were next to the horse's back. I always considered such was the case. Colonel Wood spoke about the horse-hair numnah of the American saddle. There was none in the Exhibition with that saddle; there was only the blanket that I could see. Colonel Hutton says that the numnah becomes unserviceable. I know it does become unserviceable in time; it gets hard and then gets holes in it. That is the reason why I advocate the reversible numnah so strongly. It will last four times as long as the ordinary numnah, because there are four ways of wearing it. Then with regard to carrying the carbine, I am an advocate for carrying the carbine on the body, but I think General Fraser's way of carrying it, partly on the

man and partly on the saddle, is much better than carrying it altogether on the man. I tried it this year on this principle, carried over the man's shoulder by a strap, and the muzzle in a little bucket. When the man dismounted, the carbine of its own accord came out of the little bucket and dismounted with the man in a very neat way. When the man mounted with the carbine hanging on the back he had to guide the carbine across the horse's back and then deposit it in the bucket. With regard to the injuries on the back of horse in the book of "Saddles and Sore Backs," by Veterinary Captain Smith, I know perfectly well that such injuries, caused by the particular iron arched saddle there shown, have existed, and the only reason why I drew attention to them was that I wanted to show that it was the fault of the saddle itself and not the fault of the Officers, because it gives the impression that regimental Officers do not pay proper attention to their work, and that it was from this cause that all these sores came on the horse's back. The saddle which caused them, I am happy to hear now, will no longer be in the Service. With regard to the points on the saddles, Veterinary Captain Smith told us some saddles had points behind as well as points in front, and the reason given was to prevent the saddle turning when mounting. That I always heard was the reason, but I never could think it was a good one. Certainly, anyone who has seen the cowboys drag themselves up from under the horse into the saddle would think their saddle ought to have points, but it has none. I do not think there is any necessity for these points, if that is the only reason that can be adduced for retaining them. With regard to what Major Horton said as to leather and felt for numnahs, I confess I think he was right about the felt being better than leather. I found that leather numnahs were excellent, but when they were subject to rough work the leather cracked, and therefore was no good. It is all very well for a gentleman's private stable, where it can be kept in good order and is not subjected to different climates, but it did not stand rough cavalry work. But with regard to the reversible felt numnah, I am perfectly certain that the reversible numnah is the right principle, and will last four times as long as the ordinary numnah. I will read a letter that I have had from Colonel Maberley, of the Scots Greys, on the subject of this equipment, in which he says: "I am sorry to say all your saddles were taken away from us at Brighton, shortly before we marched for Ireland. As you may remember, I had the whole of my troop fitted with these saddles and marched from Edinburgh to Aldershot with them, had two seasons at Aldershot, and thence to Brighton, by which time I had almost ceased to think of sore backs or girth galls; it was quite the best saddle for the purpose I have yet seen. The numnah being fastened behind as well as in front kept the rug in its place and the back-bone cool; the horses did not sweat so much, and cooled sooner after work. I only wish I had them in use throughout my regiment at the present time." With regard to my saddle and the tree being the same as the regulation saddle, it is very nearly the same as the regulation saddle, but there are one or two little differences. I followed the regulation pattern as nearly as I possibly could, because I got them cheaper from having them the same pattern; but, at the same time, I should be very glad to go back to the wooden saddle-tree. I thank you for the kind way in which you have attended to what, I am afraid, has been a rather dry and uninteresting lecture. The good attendance, however, and the interest taken in the lecture, show that there is a very great deal of interest taken in saddlery at the present day by Officers of the cavalry, both past and present.

Colonel WOOD: It seems to me, as all these saddles are in the country, that it would be a thousand pities if they were allowed to go out of the country. I think that we, as an Institution, ought to acquire those saddles, by hook or by crook, so that they may be kept for the inspection of Officers who wish to study the subject. Would it be possible for this meeting to express some wish of that kind?

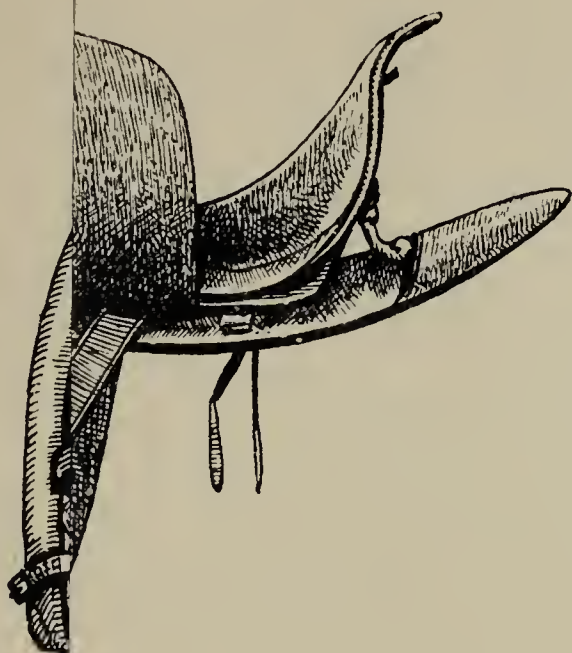
The CHAIRMAN: I also think it would be a great advantage if we could obtain them. I believe the Saddlers' Company got them through the Foreign Office, and I do not know whether they can be purchased.

Colonel WOOD: May I propose to the meeting: "That this Institution is of opinion that it is most desirable to obtain the saddles if possible, and that steps should be taken for the purpose."

Colonel BAYLISS : I shall be happy to second that.

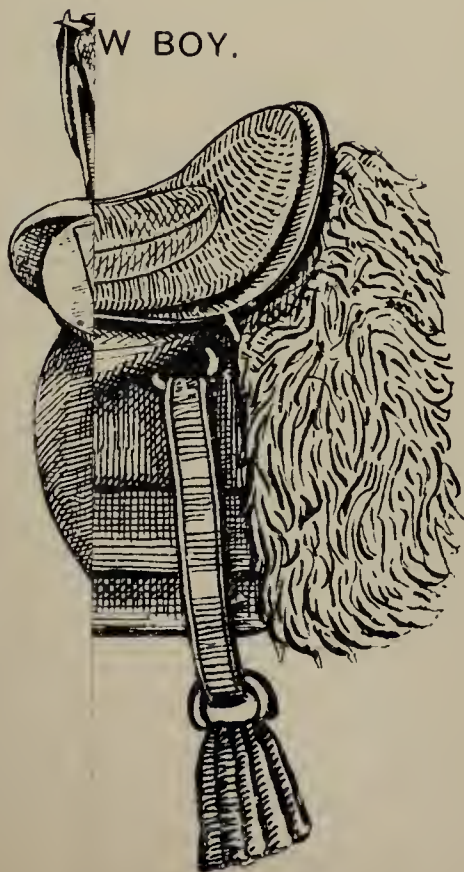
The CHAIRMAN : I think we may say that that will be carried unanimously. I understand that it is the unanimous wish of this meeting that the saddles should be kept, and that the War Office should be asked that, if possible, they may be retained in England.

CAVALRY. (FLAP UP)

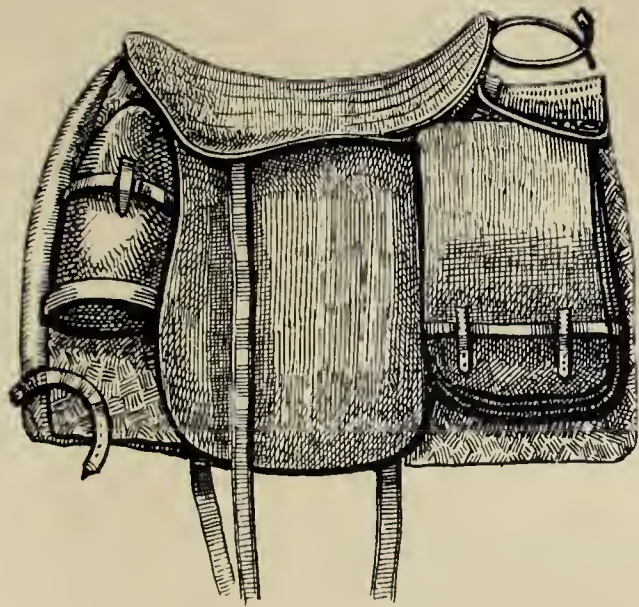


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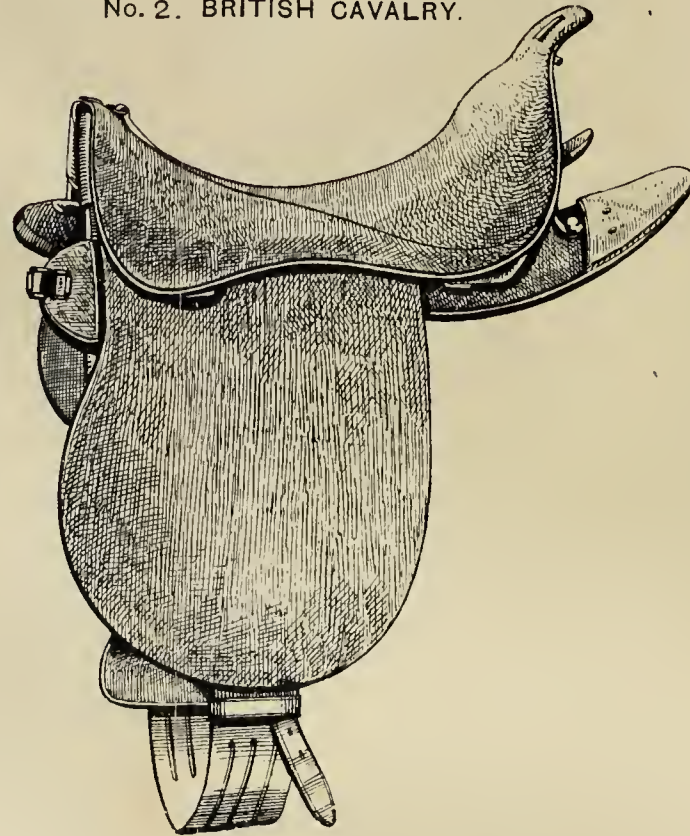
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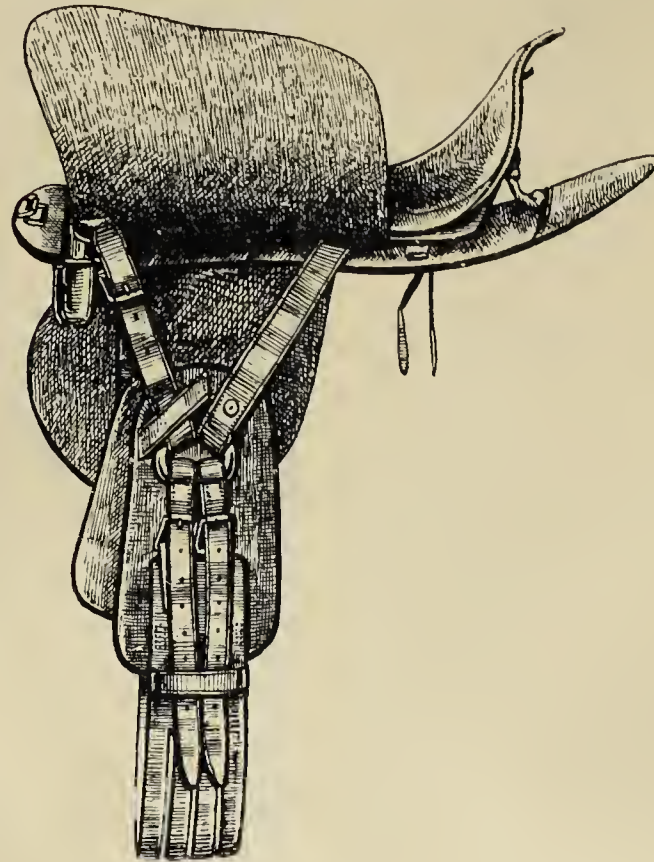
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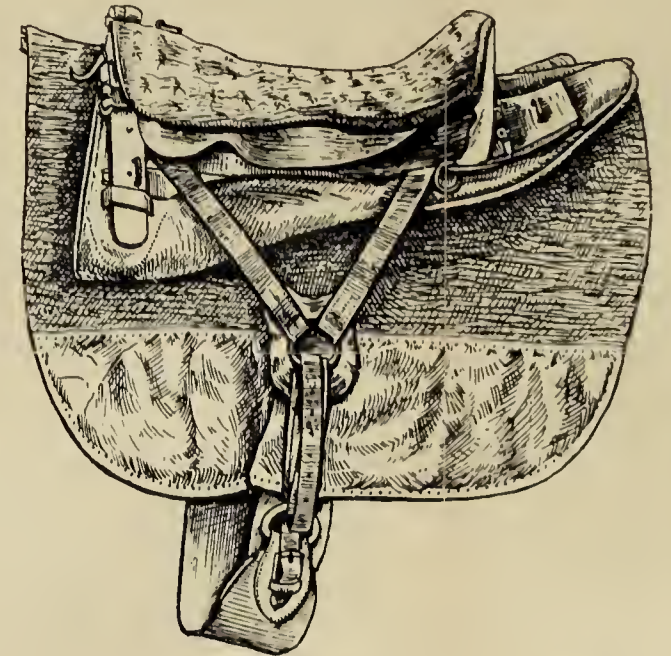
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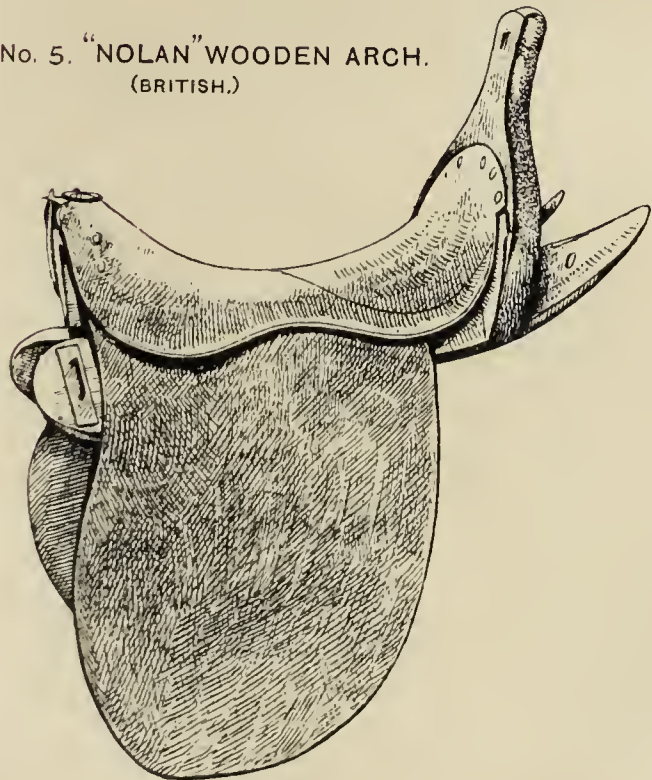
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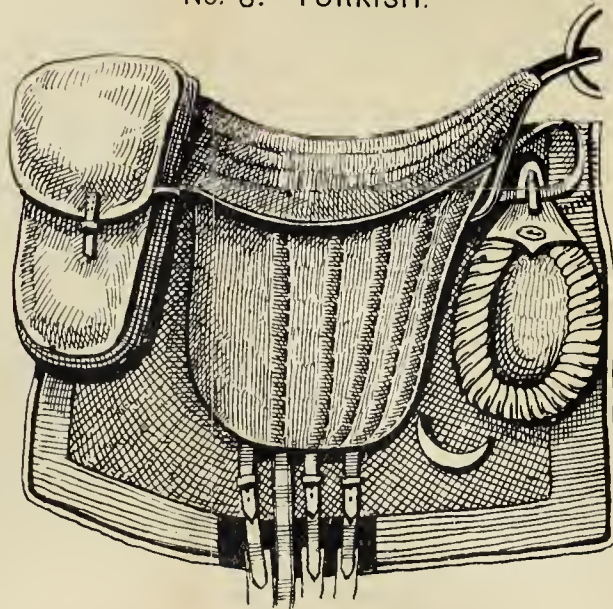
No. 4. MAJOR BROCKLEHURST
(ROYAL HORSE GUARDS.)



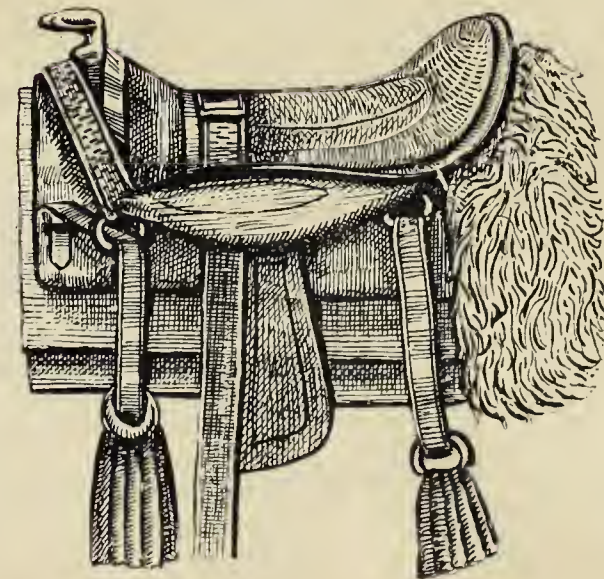
No. 5. "NOLAN" WOODEN ARCH.
(BRITISH.)



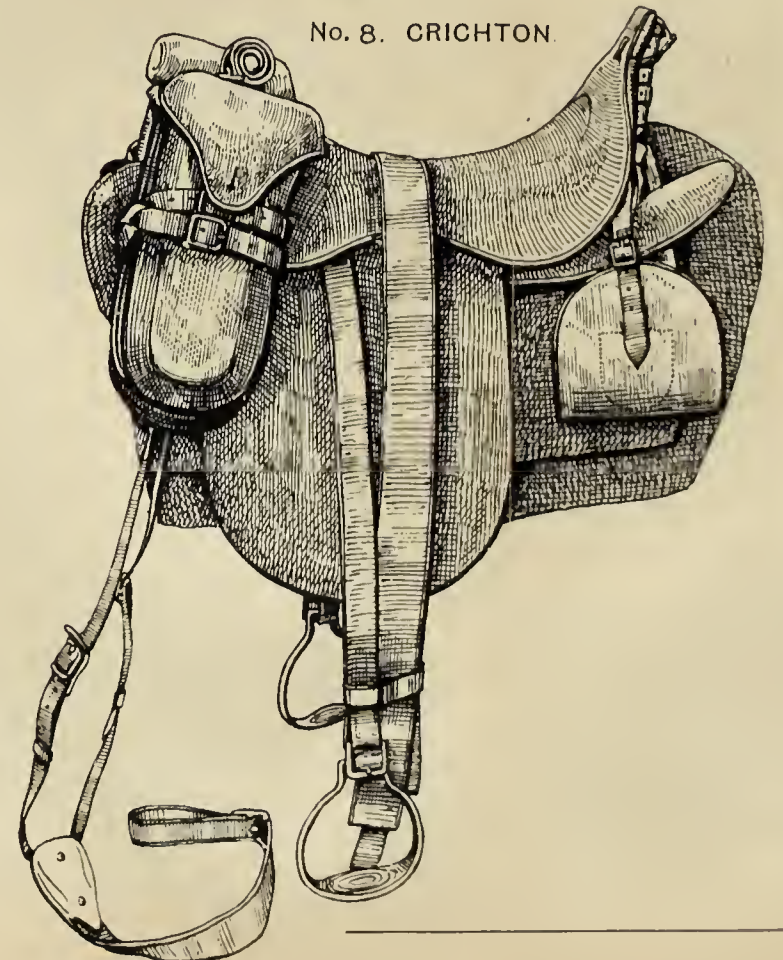
No. 6. TURKISH.



No. 7. COW BOY.



No. 8. CRICHTON.



Friday, July 15, 1892.

CAPTAIN WILLIAM DE WIVESLIE ABNEY, C.B., R.E., F.R.S., &c.,
in the Chair.

COLOUR BLINDNESS.

By R. BRUDENELL CARTER, Esq.

MR. CHAIRMAN,

It has long been known to those engaged in the pursuit of natural philosophy, and, to some extent, also to the general public, that a certain number of persons are so organized as to receive sensations of colour which differ, either in completeness or in kind, from those of the great bulk of the community. The persons so affected have been described, not very accurately, as "colour blind;" and, until lately, the various forms of the defect were regarded as collectively constituting a somewhat rare condition, which was, indeed, a proper subject for the exercise of scientific curiosity, but which was only of slight practical importance. It has been reserved for our own time to discover that colour blindness, in one or other of its forms, affects rather more than 4 per cent. of the whole male population of civilized countries, and that it affects certain classes in a still greater proportion; while, at the same time, industries have sprung up, and have attained considerable development, in which the employment of colour blind persons may easily occasion, and in all probability actually has occasioned, the occurrence of very serious calamities. It is sufficient to point out that the safe working of railway traffic and of steam navigation is almost entirely dependent upon the use of colour signals; and for these signals the colours which must chiefly be used are red and green, the very two about which the colour blind fall into perpetual error and confusion. It seems to be imperatively necessary for the security of life and property that persons with defective colour vision should be excluded from these employments, or at least from any duties in relation to them in which accidents might be brought about by their incompetence.

The whole subject of abnormal colour sense is a somewhat large one, to which it would be impossible to do justice within the limits of a single lecture; but it is my good fortune to address an audience before which the introduction of elementary matter is uncalled for. I need only remind you that what we call the sensation of white light, such as that of the sun or of the electric arc, is not only produced by

the impact upon the retina, or nervous expansion within the eye, of a rapid succession of waves of the luminiferous ether, but also that these waves must be of many different magnitudes, so as to afford a blending together of many different amplitudes of vibration. When a beam of such white light is suffered to enter a dark chamber, it can be analysed, so to speak, by the interposition of a prism; with the effect that it will not only be compelled to deviate as a whole from its original straight course, but that the deviation will be much greater for small and rapid waves than for large and slow ones. A beam of white light, originally circular in outline, will be thus extended into a horizontal band, in which the largest waves will be at one end of the band, and the smallest at the other, while the intervening magnitudes will be evenly distributed between the ends in the order of their respective sizes. There will be a regular gradation of wave magnitude, from the end of the band which is least deflected from its original course, to that which is most deflected. (Prismatic spectrum shown.)

The different parts of the band thus produced will differ not only in wave magnitude, but also, and very conspicuously, in colour. The band will no longer be white, but brilliantly parti-coloured. At the end where it is least deflected, and where the largest waves fall, it is said to be red. At the end where it is most deflected, and where the smallest waves fall, it is said to be violet. In the intermediate portions it presents the well-known succession of the prismatic colours, in which, according to Newton, red is followed by orange, yellow, green, blue, and indigo, the last passing into violet. When we come to inquire into the nature of these very striking and beautiful phenomena, we find that certain colour sensations are results of the impact upon the retina of vibrations of uniform wave length, while others are results of the impact of mixtures of different wave lengths, mixtures less complicated than that which produces the sensation of white light, but still complicated when compared with the uniform magnitude of vibration which impresses the consciousness with one of the primary or unmingled colour sensations. It seems to be determined by experiment that the primary sensations are three in number—red, green, and blue; and that each one of these, when of a certain hue and purity, is produced by the impact of waves of a single magnitude. When the simple character of these three primaries was first ascertained, they were described as red, green, and violet; but your own experiments, Sir, appear to have established that the sensation of violet is due to the dilution of spectral blue with white light; and, hence, to speak of the primary itself as “blue” seems to be the more correct nomenclature. All the intermediate portions of the spectrum are admixtures more or less complicated; and not only so, but every colour which we recognize in the universe is an admixture of one, two, or all of the three primaries, in varying proportions, and with more or less white light. This fact, long known hypothetically, has received experimental proof at the hands of our Chairman, who has succeeded, by combining selected portions of the spectrum with white light, in matching the

colour of any object which is presented to him, and in recording the constitution of the match in terms of wave-length, so that it will be available for reproduction and reference at any future period. (A patch of reddish-brown paper was here precisely matched by Captain Abney's spectrum apparatus; and the colours by which, when they were combined, the match was produced were afterwards displayed separately upon the screen.)

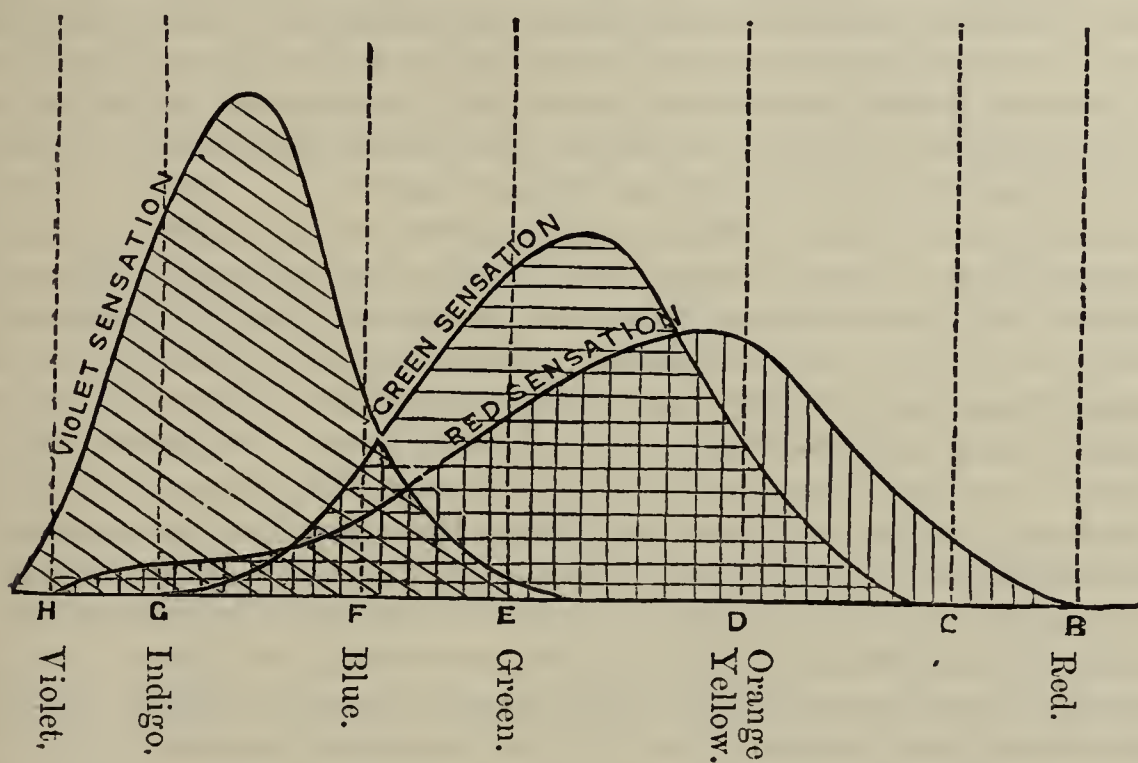
The prism does not stand alone in its power of analysing white light, although it does so in its power of transmitting the whole of the separated constituents. White light is analysed by every natural or artificial substance which presents the phenomena of colour; because these phenomena depend upon the quenching or absorption of waves of certain magnitudes, and the reflection or transmission of the residue. All colour is the result of the suppression of some of the elements which enter into the composition of white light, and few things are more curious than the great change in the properties of material substances, in this respect, which may be effected by what seems a very slight change in their constitution. Water, for example, is practically colourless in layers of moderate thickness, and will transmit the whole of the spectrum. The addition of a drop of a solution of carmine renders the water pink, that is to say, confers upon it the power of suppressing many of the elements of white light, and of leaving red to predominate. In view of this circumstance, and in view of the great variety of nerve endowment which is possessed by different individuals of the human race, it is, perhaps, surprising that the reaction of the optic nerves to colour should be, on the whole, so uniform, rather than that individuals should be met with in whom that reaction differs from the accepted type. At any rate, such individuals there are, and we must endeavour to ascertain in what respects and in what degrees the difference asserts itself.

The power of vision essentially depends upon the formation on the retina, or nervous expansion at the back of the eye, of an orderly picture or image of the object seen; an image which precisely corresponds with that produced on the receptive screen of a photographer's camera. When such an image is formed, it produces an impression upon the sensitive terminals of the optic nerve, and this impression is conveyed along the nerve fibres to the brain, where it becomes an object of consciousness. The image, when it is that of a parti-coloured object, will itself be parti-coloured in a similar manner; that is to say, its different parts will be produced by the impact of light waves of different magnitudes and combined in different proportions. We cannot positively determine the share which the eye and the brain respectively take in the discrimination of the different parts or different characters of the image; but it is at least certain that the nerve fibres which are acted upon by waves of a given amplitude must receive and convey a different impression from that which is received and conveyed by fibres which are acted upon by waves of a different amplitude. Whatever may be the colour, the impact itself is that of the luminiferous ether in wave movement; and it seems to follow, as a necessary

condition of the impression being carried along the nerve fibres, that this wave-movement must be propagated, and must excite molecular movement of a corresponding kind in the structure of the fibres themselves. If we turn our thoughts for a moment to wave movement of a coarser description, namely, to the atmospheric waves which are concerned in the production of sound, it is a familiar fact that their propagation along cords or strings will depend on the tension of those strings; and that, for example, if a series of strings be parallel, as in the common *Æolian harp*, and one of them be thrown into musical vibration, the vibration will be communicated to any others of the series which are tuned to the same pitch as the first, and to no others. A slight difference in the tension of a cord permits or prevents the transmission of given sound waves; and it is at least conceivable that a slight difference between the tension or other physical conditions of certain nerve fibres may permit or prevent the transmission through them of luminiferous waves of a given magnitude. The nerve fibres of the human eye possess a somewhat limited range of reaction to wave-movement, being sensitive only to vibrations which range in magnitude from about 4,000 to about 7,000 ten-millionths of a millimetre. Beyond either extremity of this range we have abundant evidence of the existence of wave-movement, in the form either of heat rays or of rays producing chemical activity, but both are invisible. An eye which differed from the average by being unable to respond to wave-lengths of more than 6,000 ten-millionths of a millimetre would be absolutely blind to red, and this colour, both in its purity and as an element in mixtures, would be invisible to it. An eye unable to respond to wave-lengths of less than 5,000 ten-millionths of a millimetre would be blind to blue; and one which was unable to respond to wave-lengths of rather more than 5,000 ten-millionths of a millimetre would be blind to green, whether pure or in combination. We may assume, at least provisionally, that some such conditions exist; for we find, as a matter of fact, that there is a small percentage of the human race to which red is a non-existent colour; that there is a still smaller percentage to which green is a non-existent colour, and that there is a third percentage, the smallest of all, to which blue is a non-existent colour. It has been said that people exist who are absolutely colour blind, and possessed only of the power of seeing light and shade. To such, if such there be, the world must be a sort of black-and-white exhibition; but the cases so described have been very few in number, and the evidence with regard to them leaves something to be desired. What is in a sense not uncommon is the existence of vision which is di-chromatic instead of tri-chromatic, or in which the third colour, if not absolutely invisible, is capable of producing only a faint impression upon the consciousness. The persons to whom this latter description applies are said to be "incompletely red or green blind."

According to the hypothesis of Thomas Young, as somewhat modified by Helmholtz, the natural eye is susceptible of the three sensations of red, green, and blue; and possibly derives this susceptibility from being furnished with nerves fitted to respond to each of

the three impressions; some, that is, to red, some to green, some to blue. The wave-movement which actively excites one of these sensations, however, is found to excite also, although feebly, each of the other two; and the general action of light upon the consciousness is exhibited by this diagram, taken from the Report of the Royal Society's Committee, which represents the length of the



visible spectrum, with curves indicating the relative intensities of the sensations. The lines marked by the letters B, C, D, &c., below the curves, indicate certain fixed lines in the solar spectrum at which the wave-lengths have been determined, and the names of the colours indicate, in like manner, their relative positions in relation to these lines. The different degrees of the stimulation given to each of the three sensations by every part of the spectrum is shown in the diagram by the heights of the curves above the horizontal line. Thus, in the middle of the spectrum, near E, each of the curves is to be found of a different height, and these degrees of stimulation of the three sensations, combined together, give the sensation of spectral green. It may be remarked that, on the scale adopted, the three sensations are supposed to be equally stimulated when white light is perceived. The areas of the three curves are therefore equal, and at the places in the spectrum where the curves are of equal height, the stimulation of the sensations is also the same. At the extreme red and extreme violet of the spectrum the curves of the red and the violet sensations are alone to be found, hence at those parts the sensations are simple.

According to the Young-Helmholtz theory, which seems to meet the facts of the case better than any other, the two types of complete red-green blindness are attributed to the absence either of the red or of the green sensation, the absence of the former corresponding to red blindness, that of the latter to green blindness. Where the

violet and green curves cut, the red blind person will see what to him is of the same appearance as white; and where the red and violet curves cut, the green blind will also similarly describe his sensation of colour. To the normal eye these parts of the spectrum appear as bluish-green and as green, as there is a stimulation of the green and violet sensations, or of the green alone, over and above that which is necessary to produce with the red sensation the mixed sensation of white. It follows that a red blind person will accept, as a match for white, a rose colour of some depth; and that a green blind will accept a considerable amount of green in like manner. (The colours accepted by the red blind and the green blind as matches for white were here shown by the spectrum apparatus.)

The only pure colours which can be obtained in nature are those of the spectrum; for every coloured object either reflects or transmits a mixture, and every surface reflects, together with light of the colour appropriate to it, a certain proportion of unchanged white light, which, of course, contains all the colours of the spectrum. The colour of a red geranium seems very pure to the unaided eye; but, if we look at it through a piece of peacock blue glass, which is almost impervious to red rays, and which therefore places the experimenter somewhat in the condition of a red blind person, we shall see that it contains a considerable proportion of blue; while, if the light proceeding from it were accurately tested by a spectroscope, we should also see that it contains some proportion of green, due to the white light reflected from its absolute surface. It will be observed, moreover, that its surface, when seen through the glass, seems much less bright, less luminous, than when seen with the naked eye; and we may hence infer that, to the perceptions of the red blind or of the green blind, the world presents not only a very different, but also a less luminous appearance than it does to those who are normally colour-sighted. Hence it is easy to conceive that the colour blind must often fall into mistakes occasioned by their defect, and many of these have been recorded. Dr. Nicholl says, of a boy eleven years old—

“I placed a scarlet paper on the grass, and afterwards a green baize. He said that the grass and the baize were of the same colour as the paper, but that they were a shade lighter. He told me, ‘What you call purple and pink and blue are so like each other that I cannot well know one from the other.’ He also called the gray eyes of his sister a bluish-red. A blood relative of this lad was in the Navy, and purchased a blue uniform coat and waistcoat, with red breeches to match the blue. I showed the boy a D’Oyley which was red, having a leaf of the same colour traced out on it, and I asked him the colour of it. He having been so often mistaken and laughed at, said, with an air of triumph, ‘Why, the groundwork is red, but the leaf, of course, is green.’”

Among other examples of the same kind, we have mention of a British Admiral, who painted a red tree in a landscape, and chose for himself a pair of green trousers, which he thought were brown; of an architect’s pupil, who copied a brown house in bluish-green, with the sky rose colour and the roses blue; of a colour blind family of

Quakers, one of whom bought a green coat for himself and a scarlet merino dress for his wife; of a little boy, who did not at first observe the crimson blossoms of a *Pyrus japonica* in full bloom, but who said, after they had been pointed out to him, "Oh yes, I see the flowers now, but they are not so bright as the leaves;" and of a post office clerk in Prussia, who was perpetually wrong in his accounts with regard to the sale of stamps. Sometimes he had too much money for the stamps sold, sometimes too little, but seldom or never the right amount. At length it was discovered that he was colour blind, and that he could not distinguish red stamps from green ones. Similar instances, some ludicrous, some tragic, might be multiplied indefinitely.

At first sight it seems even more remarkable that the colour blind may not only remain in absolute ignorance of their own defect, but that they may also, unless discovered by some accident, entirely escape detection by the ordinarily unobservant people around them. They owe their ignorance and their immunity to what Dr. South aptly described, in relation to a very different subject, as "the terrible imposture and force of words." From childhood, they hear colour names used correctly, and they learn to use them in the same manner. They call grass green, and they call cherries red. If the two colours appear to them to be much the same, they try to discover trivial but sufficient differences by which to distinguish them, and they find these differences in differences of luminosity. The child who said that the blossoms of the *Pyrus japonica* were not so bright as the leaves was red blind. To him a red surface was not invisible, or non-existent, but was rendered visible by the feeble luminosity of the light, other than red, which it reflected. It would be a dull or dingy surface, resembling that of the leaves in colour, but not so bright. He would be told that the flowers were red and the leaves green, and he would interpret red as a dingy shade of the same colour as green. Dr. Nicholl's boy, who saw the outline of a leaf traced on the red D'Oyley, did not hesitate to say that the leaf itself was green, merely because he had been told that leaves were green, and he recognized the object by its outline. Ninety-nine times out of a hundred he would have avoided detection by calling a leaf green. I have met with several instances in which declared colour blindness has been unknown to near relatives who were in frequent communication with the subject of it.

If we take the two children above referred to as illustrations of the incapacity for certain duties which colour blindness might produce, I think it will be evident that neither of them would have been trustworthy in relation to the needs of railway travelling or of navigation. It is possible that both, supposing them accustomed to see red and green signal lights, might have distinguished these lights apart on seeing them together; but neither of them, on seeing one light only, could have declared whether it was red or green. Now it is required from the engine driver, or from the look-out man, not that he should be able to distinguish red from green when the two are side by side, but that he should be able to pronounce instantly upon the

nature of a single light, which, at sea especially, may make its appearance suddenly, and in an unexpected place. The apparent luminosity of a light is liable to be modified by so many circumstances, such as the nature of the flame furnishing it, or the character of the atmosphere through which it is seen, that luminosity alone, with no standard for comparison, can never be a sufficient guide; and yet it is the only guide which the colour blind possess. To many of them a red and a green light are absolutely undistinguishable as colours, although one may seem to be brighter than the other.

It may therefore be assumed, that persons who are completely either red blind or green blind are unfit for the discharge of any duties, either on sea or land, in which it is necessary for them to distinguish colour signals with ease and certainty; and it may further be assumed, that even incomplete red or green blindness may be of such a degree as to entail a similar incapacity. The only remaining question is, as to the best way of preventing colour blind persons from undertaking duties which they cannot discharge with safety to others, or with satisfaction to themselves.

In order to determine this question, the chief points to be remembered are that colour blindness is a matter of formation, very frequently of inheritance, and that it is absolutely incurable and unalterable. There is, no doubt, a form of colour blindness arising from disease, or, generally speaking, from the excessive use of tobacco, which is acquired, and which may be recovered from; but this is foreign to the main subject before us, which relates to congenital or structural defect. Very extended observations made in every civilized country have shown that the born colour blinds bear everywhere about the same numerical proportion, namely, among males a little over 4 per cent., to the colour sighted, and it is generally held by those who have paid most attention to the question that the most politic course with regard to them would be to discover their defect in childhood, and to restrain them from entering upon any calling in which it would be dangerous. If a boy at school were discovered to be colour blind, his parents should dissuade him from even attempting to enter any service in which his defect would be at once a source of danger to himself and others, and a bar to promotion. In the meanwhile, and until scholastic examinations are instituted as matters of course, the best alternative seems to be an examination of every man who seeks to enter either railway or marine service, and the rejection on the threshold of those who are unfit. By this course, almost as much as by the other, the infliction of hardship on meritorious persons would be avoided.

Examinations of some sort or other have now been in operation for several years, both in the Royal and in the Mercantile Navy, and in the general railway service of the country; but the results have not always been entirely satisfactory. The examination now required of candidates for the Royal Navy leaves little, if anything, to be desired; but that of the railway companies, and of the Board of Trade for the mercantile marine has been very defective. In both cases the defects have mainly arisen from want of knowledge. The colour standards

used have been unfit for the purposes they were intended to fulfil, and the method has often resolved itself into an examination on the names of colours, instead of being, as it should be, a procedure calculated to discover the existence of any peculiarity of vision in the person tested. In the mercantile marine only Officers are examined, so that the unquestionable grievance of the rejection of the colour sighted, and the risk involved in the acceptance of the colour blind, although both have existed, have not been felt by any large number of people. In railways the case has been different, and one of the Trades Unions of railway workers commenced a sort of agitation two years or so ago against the examinations in colour vision to which the men were subjected, and by which, according to the complainants, they were liable to be wrongfully deprived of their occupations and means of living. This agitation led indirectly to the appointment of a Committee by the Royal Society, with the sanction of the Board of Trade, for the purpose of investigating the whole question, and I trust that the Report of the Committee, which has now for some time been in the hands of the Board of Trade, will lead to reforms which are clearly necessary or desirable.

It would seem at first sight that the most natural way of testing the colour vision of any candidate for employment would be by the use of the very signals which he would be required to recognize in actual work; but neither for railways nor for the marine would such a method be either safe or sufficient. The lights to be distinguished apart are only two in number, and even to the most pronounced colour blind they would not appear exactly alike when shown side by side or in immediate succession. As already explained, one would be likely to be darker or less luminous than the other, and this difference would in many cases be sufficient to lead to an accurate guess as to which of the two was being displayed. Even without this guidance there would be an even chance of a correct guess; while the point of interest is to discover whether the appearance of the two lights is sufficiently different to the person tested to enable him to distinguish either of them at a glance, and in any possible conditions of illumination or of atmosphere. For this purpose, as was long ago shown by Holmgren, it is necessary to ascertain what colours resemble each other in his eyes, and the only way to do this is to call upon him to make matches from a number of coloured objects. The best objects for the purpose are skeins of Berlin wool; but their advantages depend chiefly upon their being easy to procure in a sufficient number of tints, easy to carry about, and easy to handle. But for these considerations, and also but for the absence of reflection from the dull surface of the wool, any other coloured objects would do equally well. It is necessary to lay stress upon this point, because many volunteer or amateur examiners have appeared to think that the essence of "Holmgren's method" consisted in using wool as a test object, without reference either to the colours employed or to the mode of employment. The truth is that Holmgren's method consists in the use of special colours in a very precise manner, and that the material is only an accident, even

if an important one. Holmgren desires to compel the colour blind person to betray himself by the selection of wrong colours to match those which are given to him as standards. In order that this may be accomplished with unfailing certainty, the standards themselves must be carefully selected under the guidance of adequate knowledge. The collection of skeins of Berlin wool should be about 150 in number, and should include reds, oranges, yellows, yellowish-greens, pure greens, blue-greens, blues, violets, purples, pinks, browns, and grays. Several shades of each colour, with at least five gradations of each tint, should be procured, from the deepest to the lightest greens and grays. Varieties of pinks, blues, and violets, and of light gray, together with shades of brown, yellow, red, and pink, must be especially well represented. The test skeins with which the examinees are to compare the colours should be three in number, a light green, a pale purple or pink, and a bright red. These three colours will suffice to indicate approximately the amount and kind of colour blindness which may exist. The light green skein, which is a tolerably pure green diluted with a large proportion of white, is chosen as the colour which closely matches the spectrum colour which the red or green blind accept as white or gray. It is chosen of a pale tint in order that the colour blind may be unable to distinguish its colour by its luminosity. A light gray or drab skein will present to the colour blind the same luminosity that this pale green does; and, although he may have been trained to distinguish bright colours by their relative luminosities, in the case of the pale varieties he will be unable to do so. The light purple or pink is chosen for similar reasons, and in fact it is nearly a complementary colour to the green. The purple is, according to the Young-Helmholtz theory, a mixture of two fundamental colours, the blue and the red, and as in the green blind it excites both the blue and the red sensations, it may be confused with gray or with a green. In the red colour blind it excites in excess the blue sensation mixed with what they call white. A blue or violet may therefore be matched with it.

In proceeding to the examination, the wools are thrown in a loose heap upon a white cloth in good daylight. If many persons are to be examined, twenty or more may all be assembled round the table, and may watch each other's proceedings; and they may all at once receive verbal instruction as to the course they are to pursue. The first test skein, the light green, is laid somewhat apart from the heap, and the examinee is directed to select from the heap, and to place alongside of the test skein, several specimens of the same colour, it may be in lighter or darker shades, but of the same colour. The word green should not be mentioned, and no colour names should be used at any part of the examination; the object being to discover what the examinee sees, and not what he calls it. The examiner may himself set the example, by selecting a few skeins and throwing them aside. The great majority of the examined will proceed with ease and certainty, rapidly selecting the green skeins from the heap, and neglecting all others. It is well to direct them not to touch the test skein, and not to touch any skein in the heap until they have first

selected it by the eye; although they may turn the heap over in order to bring the under ones into view. Presently, someone will look at the standard and at the heap with a more or less wistful and uncertain expression, and then will pick out, perhaps along with true greens, such colours as grays, drabs, and yellows. Either he is more or less green blind, and does not see the element of green in the standard, or he is more or less red blind, and does not see the element of red in the colours which he selects. The fact of his defective colour sense is declared; but the examiner has still to ascertain its nature and its degree. For this purpose the second or diluted purple skein is used. An examinee who matches with it blues or violets is completely red blind; and one who matches with it drabs or greens is completely green blind. One who, although with some difficulty and uncertainty, selects only purples, may be regarded as incompletely colour blind. The chief use of the red skein is to furnish dreadful examples among those persons whose defective colour sense has been ascertained by the earlier tests. The red blind will select as matches dark green or chocolate; the green blind will select bright green or bright brown.

An examinee who selects only greens to match the green may at once be passed as correctly colour sighted; and one who makes faulty matches with the purple should at once be rejected as colour blind. It does not follow that he will confound red and green lights when these are exhibited in immediate succession or side by side; but he will often do so, and he may always be made to do so by a little management. He distinguishes not by colour, but by relative luminosity; and this is an uncertain and untrustworthy guide. The more often he distinguishes correctly, the more certain it is that he will be betrayed into error at last. I have here two different forms of lantern, each so constructed as to exhibit two lights, each of any desired colour, either singly or together, and each light admitting of being transmitted through a larger or smaller aperture, or of being partially veiled by the interposition of smoked glass. With such lanterns those who have been discovered to be colour blind by Holmgren's method may always be made to betray themselves, and to commit errors which would be of terrible significance in the conduct of either railway or marine traffic. To the colour sighted, on the other hand, no changes of this kind are of the least importance, red being always red, and green always green, and any mistake between the two being practically impossible.

Besides the very declared cases, the examiner will meet with some in which he can say no more than that the colour sense is defective; and a question may arise whether the people so described should be called upon to judge of signals. For my own part, and if the question be one of entering railway or marine service, I should say certainly not. The people are not to be entirely relied upon, and they ought not to be employed. No man in his senses would travel by a train or steamer if he knew that the driver in one case, or the look-out man in the other, was of uncertain colour vision. The hardship of refusing such people would be very small, because they are com-

paratively few in number and may find other occupations, while the results of an error arising from their incompetence might be as disastrous to themselves as to others. I would myself reject, on the threshold of railway or marine service, every candidate who selected any confusion colour, any drab, yellow, or gray, to match with the first or green test skein, or who even hesitated and looked twice at such colours before rejecting them.

Considering, however, that the methods of examination employed by many railway companies, and by the Board of Trade for Officers of the mercantile marine, are extremely faulty, and that through them, in all probability, many colour blind persons have slipped into both services, while many colour sighted have been ignorantly rejected, the question of incomplete colour blindness might be somewhat differently regarded if it had reference to the retention in employment of a person who had once been admitted, and who had discharged his duties satisfactorily. It is difficult to estimate the degree in which such a person might have learned to compensate for his defects by increased observation of differences of luminosity, or even of differences of some other kind which might escape the notice of those to whom they were less important; and hence many attempts have been made to devise means of measuring and expressing the degree of the defect. If this could be accurately done, it might perhaps rest with employers to lay down some rule as to the degree of acuteness of colour vision which they would require, and it would then rest with experts to declare whether this degree was reached in any given case. Dr. Holmgren devised an instrument which I have here, and which he called a chromato-skiameter. It consists of a central pillar supporting a lamp, and supporting also two long arms, which extend horizontally at a right angle to each other. One of these arms supports a white porcelain screen, and a slender rod which casts a shadow upon the screen. The other arm supports a sliding mirror, by the reflected light of which a second shadow of the rod is made to fall close to the first. If we interpose a piece of coloured glass between the rod and the lamp, the two shadows will assume complementary colours and will be of unequal luminosity. By placing the mirror at a certain distance from the lamp, their luminosity would be equalized to a colour sighted person, but would still be unequal to the colour blind. The amount of alteration in the position of the mirror, as read off upon a graduated scale, which is required in order to equalize the luminosity of the shadows for the colour blind, was expected to furnish a numerical statement of the degree of the defect. Our Chairman devised a still better apparatus for the same purpose, in which the luminosity of a patch of colour can be compared with that of a patch of white light, the intensity of which is determined by the size of the revolving sectorial aperture through which it is admitted. Both methods are open to the objection that they require a more cultivated power of observation than a candidate for railway or marine employment would often be likely to possess; and that, however admirable for testing the vision of a philosopher, they would be far less applicable to a clown. I have

endeavoured to devise a method of another kind, with which, so far as I have been able to test it, I am well satisfied. My instrument is here, and it consists of an oblong box, which has at one end an outside lamp and two visual apertures, at the other a slide carrying test objects. These objects consist of groups of dots of different colours, the arrangement of the colours admitting of infinite variety. The light of the lamp is admitted into the box by an aperture, the size of which is controlled by a screw acted upon from without; and a lens is so placed that all the light which enters the box is distributed over the surface of the test object. The size of the aperture may be increased from zero to 1,500 sq. mm.; that is to say, the spots may be flooded with light, or may be left in almost complete obscurity. Now I find that a person of normal colour sense is perfectly well able to distinguish a group of dots, some of which are light red and others light green, and to say which are which, with an illuminating aperture of 4 sq. mm. I have found partially colour blind people who required an aperture of 80 sq. mm. in order to do the same thing; and I have found absolutely red blind or green blind people who could not be made to do it at all. I have used this test apparatus in cases in which colour vision has been impaired by disease; and I have found its indications to correspond closely with other signs of improvement or of deterioration.

The Committee appointed by the Royal Society, after holding many meetings, and receiving much evidence, have arrived unanimously at the following recommendations, which, as I have said, have been transmitted to the Board of Trade, and with which I may perhaps fitly bring this discourse to a close:—

1. That the Board of Trade, or some other central authority, should schedule certain employments in the mercantile marine and on railways, the filling of which by persons whose vision is defective either for colour or form, or who are ignorant of the names of colours, would involve danger to life and property.

2. That the proper testing, both for colour and form, of all candidates for such employments should be compulsory.

3. That the testing should be intrusted to examiners certificated by the central authority.

4. That the test for colour vision should be that of Holmgren, the sets of wools being approved by the central authority before use, especially as to the correctness of the three test colours, and also of the confusion colours. If the test be satisfactorily passed, it should be followed by the candidate being required to name without hesitation the colours which are employed as signals or lights, and also white light.

5. That the tests for form should be those of Snellen, and that they should be carried out as laid down in Appendix VI. It would probably, in most cases, suffice if half normal vision in each eye were required.

6. That a candidate, rejected for any of the specified employments, should have a right of appeal to an expert approved by the central authority, whose decision should be final.

7. That a candidate who is rejected for naming colours wrongly, but who has been proved to possess normal colour vision, should be allowed to be re-examined after a proper interval of time.

8. That a certificate of the candidate's colour vision and form vision according to the appointed tests, and his capacity for naming the signal colours, should be given by the examiner; and that a schedule of persons examined, showing the results, together with the nature of the employments for which examinations were held, should be sent annually to the central authority.

9. That every third year, or oftener, persons filling the scheduled employments should be examined for form vision.

10. That the tests in use, and the mode of conducting examinations at the different testing stations, should be inspected periodically by a scientific expert, appointed for that purpose by the central authority.

11. That the colours used for lights on board ship, and for lamp signals on railways, should, so far as possible, be uniform; and that glasses of the same colour as the green and red sealed pattern glasses of the Royal Navy should be generally adopted.

12. That in case of judicial inquiries into collisions or accidents, witnesses giving evidence as to the nature or position of coloured signals or lights should be themselves tested for colour and form vision.

Rear-Admiral BOWDEN-SMITH: The lecturer has called our attention to the necessity of efficient eyesight in those persons who have to do with signals, not only as regards plain sight, but as regards colours. He pointed out the fact that the Board of Trade have recently given orders that Officers should be examined with regard to colour blindness, and we know that some Officers in the mercantile marine, who have got up nearly to the top of the tree, have lost promotion to the rank of Captain through the discovery late in life that they were not able to distinguish colours. I happen to have been for many years on the Committee of the Marine Society. We always try to have an average of 200 boys on board of our training ship the "Warspite," and as we only keep those boys on board nine months before they are drafted into the mercantile marine or into the naval training ships, you will understand that a considerable number of boys pass through our hands. Since the agitation has been set on foot about colour blindness, we have instructed our medical Officer to examine these boys very carefully, not only as regards efficient eyesight, but that they should know their colours. Since those instructions have been given, for some three or four years, we have noticed that about ten per cent. of the boys who come to us are rejected as having defective eyesight, or because they are colour blind. The boys we get in the Marine Society are mostly destitute boys. Some are taken from the streets and some from the workhouses, but there is also a considerable number of a better class. My idea is that these boys are not colour blind at all, but that they are "colour ignorant," that is, they have never been taught their colours. Sometimes we examine a rejected boy in the committee room, and we ask him the colour of the table cloth, which is red, and which he would probably call "green;" but with some it has been found that after a month or two they can be taught their colours, and are thus enabled to pass in. I should like the lecturer to tell us by-and-bye if he ever came across a really educated person who did not distinguish colours. I daresay there may be such persons, just as with regard to music there are people who do not know one tune from another, I daresay there are some people to whom you might sing "Ta-ra-ra boom-de-ay," and they would not know it from "God save the Queen," but I have never known any one really educated who was colour blind. The lecturer has given us instances which he has heard of, but I do not understand whether they have come under his own notice. These boys that we have had to do

with are mostly poor boys, and have not been properly educated. Mr. Brudenell Carter has referred to the red and green lights on the railway and on board ship. These are really the only coloured lights we have to deal with, and, perhaps, it would be interesting to the audience to know why they are the only colours available. The reason is, that they are the only colours you can get to carry any distance. You all know that steamers carry a white light at the fore-mast head, and a starboard green light, and on the port side a red light. They show, however, no fixed light astern, and it has been proposed that ships over a certain size should carry such a fixed light. Often at sea we see so many white lights, especially in crowded waters, that at first sight it would appear desirable that this stern light should be some special colour. When, however, we come to look into the matter more closely, we find that we cannot use any other coloured light, and for this reason, that there are no other colours easily distinguished from red and green, which will show any distance. Some years ago I witnessed some trials at Shoeburyness, by the kind permission of the Board of Trade, and there we tried, amongst other colours, light blue, and a mauve or purple, and a yellow and orange. At a short distance the mauve or purple looked exactly the same as the red light. The light blue does not carry for any distance, and the yellow, if a pale colour, is easily mistaken for the ordinary white light; if a deep orange it can be mistaken for the red; in fact, the only colours that it seems possible to use for signals are red and green, and that I presume is the reason why railways and ships use those colours and no others. Now on board ship these red and green lights are only supposed to be visible for 2 miles, and it was said by many gentlemen at the late Maritime Conference at Washington that now that we have fast steamers, going 18 or 20 knots, a side light showing only 2 miles is ridiculous, and that the range ought to be increased to 5 miles; but you cannot get coloured lights to show 5 miles unless at a greatly increased cost. The fact of the matter is, that with these coloured lights and the thick glass that you have to use to bear the shock of the sea, it is calculated that from 70 to 90 per cent. of the light is lost. The German, Austrian, and American delegates had tables with them, showing the amount of loss, but as they did not quite agree in their figures, I cannot give you any definite percentage of the loss, but it ranged from 70 to 90 per cent., and that shows you how very difficult it is to get even a red or green light to carry for any considerable distance. The lecturer told us that in the Navy there are good regulations by which not only our Officers, but also the men, are tested with regard to eyesight, and I hope it is so. But I will give one instance of a case which occurred to me only some few years ago, to show how even the best doctors can be deceived. It was not a matter of colour certainly, but it is an interesting fact. My last command was the "Britannia," before I got my flag. We have a good many servants, of course, having a large number of cadets, and a letter was written to me from home asking me if I could take a young lad as servant, if there was a vacancy. I knew the lad, he had waited upon me at home, he was a very smart fellow, and I offered to take him. My people further informed me, however, in case I had not observed it, that the boy had a glass eye. I sent for the medical Officer, and said, "Here is a boy I want to enter very much as a servant; he is a very smart boy, but he has a glass eye; perhaps you won't like to enter him." "Oh, no," he said, "I cannot possibly enter him, it would be against my instructions." "Well," I said, "you wouldn't have known it if I had not told you;" and I gave it up. Ladies and gentlemen, I told you that he was a smart boy, but he was a much smarter boy than I took him for—he left my brother's service and went to Portland, where we have a training ship. He presented himself for entry as a servant, without saying a word about the glass eye. He was examined and entered, and they never found it out, and, I believe, he is at present doing very well indeed as a steward, in spite of his having only one eye.

Mr. BEATTIE-CAMPBELL: I should just like to endorse what Admiral Bowden-Smith has said with regard to red and green being practically the only two easily distinguishable colours for any distance at sea. Some years ago, on the Grand Trunk Railway of Canada, it was thought desirable to make some change in the signal lights. It was supposed that the engine drivers could not distinguish accurately between the green and red sometimes. A purple light was, therefore,

tried as an experiment instead, but it had to be withdrawn. It would not answer at all. This bears out what the Admiral has just told you. The fact that the drivers were not always able to distinguish the red and green lights, may have been from different atmospheric causes, or, perhaps, even the men were not at all times quite in the same condition themselves.

Captain O'CALLAGHAN: I rise for the purpose of asking some explanation from the lecturer on one point—an explanation which I have no doubt he will give satisfactorily. But, before I do so, I would ask to be allowed to make a remark on the subject of red and green signals. Those who have given much consideration to the subject are aware that a large proportion of colour blind people cannot distinguish red from green, and it is also ascertained that there is hardly anyone not absolutely colour blind who mistakes red for blue. Admiral Bowden-Smith has told us of the difficulty of getting colours which can be seen at a long distance, and also that blue may be mistaken for green; but I do not think it can be mistaken for red; and as for the question of luminosity, I suppose that may be obtained at a greater distance by the use of stronger lights, or possibly lighter coloured glass. I have taken every opportunity—and I have not had many—of suggesting that signals both for land and sea should, if possible, be red and blue rather than red and green, because the two former are not liable to be mistaken to anything like the same extent as the two latter. The question I would ask is this: we are told in some scientific works, as well as in the lecture to-day, that impressions on the retina may be classed as red, blue, and green; but the common theory of colours, given as the three primary colours, blue, red, and yellow, and we are told that from these all the others can be produced. Now I do not think that applies to red, blue, and green, because no combination of red, blue, and green, or any two of them, will give us yellow, whereas blue and yellow mixed will give us green. I hope the lecturer will favour us with an explanation of the difference between the two theories—the one, which is given in some scientific books, and the other, which appears, perhaps wrongly, as the more simple and the more practical. We are taught that if a disc is divided into blue, red, and yellow in certain proportions, and made to revolve rapidly, it will appear white or nearly white, and that its not being quite white arises from impurity in the colours; but I do not think that will apply if we get red, blue, and green. We know that green may be produced by blue and yellow, and we also know that yellow cannot be produced by any mixture of any other colours. I may now, with your permission, advert to certain external indications of colour blindness of which I have had some remarkable instances. When I was at the School of Musketry at Hythe, one day after dinner the discussion turned on the question of colour blindness. An Officer who was present said he had a defect in his perceptive faculties, and he wished to know if anyone could tell it. I told him I could not tell simply by looking, but if he would allow me to examine him I would endeavour to tell him. I found a marked depression over the eye, which is by many associated with imperfect development of the colour sense, and I told him I was certain that there was some defect in his perception of colours, though I could not tell to what colours it extended. He informed me he could not tell red from green. He said he could not notice the red blossoms of clover—that if bright green and bright red objects were placed side by side he could see that they were not quite alike, but he could not decide which of the two was the red. Whilst I was an Adjutant of Volunteers a man came into the headquarters of the corps, and on examination fulfilled all the necessary conditions. As he left the room I said to the sergeant-major, "That man is colour blind." The following summer I happened to be in the same compartment of a railway carriage with this man, going to the range. I said to him, "Don't you sometimes find a difficulty about colours?" "Oh," he said, "I know nothing about colours; I am obliged to ask my wife the colour of everything." I could multiply these instances almost indefinitely as showing a connection between a certain external defect and the inability to perceive certain colours.¹

¹ Some combinations of the prismatic colours shown by the Chairman after the lecture did not support the statement of the primary colours being red, blue, and

Mr. BICKERTON: I find some considerable difficulty in rising to address a few remarks to you, and from two reasons. The first is, that Mr. Brudenell Carter has such a facility and felicity of expression that most people who follow him must be at a disadvantage, and the second reason is, that he is such a master of his subject that it is impossible for anybody to cavil at any remarks he has made upon the physiological aspects of colour blindness. But I may be allowed, perhaps, to dilate upon his remarks on the practical aspect of this subject and to give you some reasons why the conclusions of the Committee of the Royal Society were necessary. In the first place, we, the medical profession, Mr. Brudenell Carter, and others, believe that a very large number of the accidents and collisions that take place at sea are directly due to colour blindness and defective sight on the part of the look-out men and Officers. This has been exceedingly difficult to prove, and for many reasons. The men themselves object to being examined; the Officers will not be examined; the ship-owners will not admit for an instant that any of their men have defective vision, and when collision cases come before the Board of Trade, up to quite recently, the colour question has been entirely left in the background. It is necessary, therefore, to try to prove why we think that these collisions are due to some extent to defective sight and colour blindness. The American Board of Trade mentions that from the year 1859 to 1866 there were 2,408 collisions. Accidents which it was impossible to avoid accounted for 1,562. Errors of pilot or Captain accounted for 215. Want of proper interpretation of rules of the road accounted for 537. Undetermined causes accounted for 94. Therefore, of the 2,408 cases, at least 846 might have been due, I do not say they were, but might have been due, to colour blindness or defective vision. If we take the Wreck Register for 1887, of 1,263 accidents the English Board of Trade makes "causes unknown" account for 209. Now, with regard to these accidents from unknown causes, we not unfrequently read remarks like the following, and I quote this from the "Times" of February 5, 1889. The "Times" was commenting on the terrible accident that occurred in the Channel, when the "Nereid" and the "Killochan" ran into each other, and in less than five minutes went to the bottom, carrying down twenty-three men out of forty-two. The remark was as follows: "All enquiries respecting the cause of this disaster lead to the same conclusion, that it was due to one of those astounding errors of judgment on the part of one or other of the navigators which seem to defy all attempts at reasonable excuse. Each blames the other." But read in the light of our knowledge, and we have a simple and natural explanation of a mysterious and unaccountable collision, and so long as colour blind and defective sighted men are tolerated in the mercantile marine, just so long may we continue to read of "mysterious and unaccountable" disasters. It is not as if this argument of ours is anything new, for as long as ninety-eight years ago, in 1794, Professor Wilson, of Edinburgh, in speaking of these accidents, wrote the following prophetic sentence: "The appalling yearly list of lost vessels which appears in our wreck returns awakens the suspicion that more than one of these fatal disasters may have resulted from the mistaken colour of a light-house, beacon, or harbour lamp, which, on a strange coast and with the accompaniments of a snow storm or a thick fog, has been wrongly deciphered by a colour blind man." All are well aware of a case which occurred in America, in which it was practically proved that a collision, in which ten lives were lost, was due to the pilot being colour blind, the error being that he mistook the green light which he saw ahead of him for a red light, and ported. The consequence was, he ran clean into the vessel he wished to avoid, and sank her. I myself feel inclined to the belief that if the Officer on board the "Nereid" was examined, he might be found to be colour blind. This collision between the "Nereid" and "Killochan" was followed by a very long correspondence in the "Times," by Admiral Colomb and various other eminent and distinguished naval authorities, who gave all sorts of reasons why the accident should not have occurred, but they did not give one single reason why it should have occurred, except that the man ported the helm when he should not

green, but rather confirmed the commonly received theory of their being blue, red, and yellow. A combination of blue and green did not appear yellow, but light green, and blue and yellow together appeared green, and not white.—E. O'C.

have done so. That is the origin of most accidents, I take it. And mind you, this accident between the "Nereid" and the "Killochan" occurred on a perfectly clear night, and the two vessels had had each other in view for some time. The remarks I have made may be applied also to the collision between the steamships "Douro" and "Yuruac Bat," which came to grief on a perfectly clear night, more than two score people being drowned. In regard to the "Toronto" and "Freidis" collision occurring in the Irish Channel, it is interesting to notice that the Captain, two Officers, and the Quartermaster said that a certain light they saw was red. The look-out man said that there was no red light, that it was a green light, and being asked by the Justices what was the cause of the accident, he said that it was owing to his own Captain porting his helm. In a letter published and commented upon in the leading Liverpool shipping paper, the "Journal of Commerce," referring to this case, it is remarked that "the negative evidence of the look-out man, that he did not see the red light, cannot weigh against the positive evidence of the Captain, two Officers, and the Quartermaster, that they did see it, and it has yet to be ascertained why it was not seen by him." In this remark I agree, for, although there is no evidence that he was colour blind, neither is there any evidence that he was not. Common sense would say, "Have the man tested;" but the wiseacres who adjudicate these matters do not consider such matter-of-fact methods necessary, and are content to ask the question, Did any one ever know a sailor who acknowledged himself colour blind? In the above case, the Court took the opinion of the irresponsible look-out man, reprimanded the Officers, and took away their certificates for a time. In the collision between the "Romulus" and "Belgrano," where, on a perfectly clear night, two steamers ran into one another, the conflict again was the question of lights. On this subject a great number of our naval authorities still seem as if they will not admit the possibility of imperfect vision and colour blindness causing disaster. One of these gentlemen is Admiral Colomb, and he has, in my opinion, done much harm, and has been a great power in preventing this subject of colour blindness of sailors receiving the attention it deserves. In the course of an able paper delivered by him on the subject of the Washington Maritime Conference, at the Society of Arts, and reported in the "Times" of March 28, 1890, he made the following statement: "As to the qualifications for Officers and seamen, the Conference (Washington) dealt wholly with the question of colour blindness on account of its danger with reference to the red and green side-lights. He never knew, himself, a case of collision where colour blindness was in question. The statements were generally perfectly clear that wrong helm was given deliberately in the face of the colour seen, and as no authoritative teaching had existed to show that it mattered what colour was seen so long as danger was denoted, he had never been able to lay stress on the colour blind question." Mr. Baden-Powell, R.N.R., who followed in debate, declared "that in all cases of collision at sea, there was no default of the rule of the road at sea, but they generally arose from negligence. The rule of the road at sea was perfectly well understood by intelligent men, and it was the 'lubbers' and the careless who did not act according to it. Admiral de Horsey considered collisions at sea were caused principally by three faults—a bad look-out, ignorance of the rules, and neglect of the rules." In opposition to the opinions of these eminent gentlemen, I will quote the opinion, in which I fully agree, expressed by a gentleman who wrote to the "Liverpool Daily Post" in the following terms: "Is it reasonable to believe that steady married seamen, with families depending on them, and who have had years of experience, suddenly lose all judgment and common sense and steer their vessels on clear nights, sometimes in broad daylight, so as to deliberately ram each other, thereby losing their lives and ships and the lives of the passengers? Surely not. In none of the other professions and callings can we find anything approaching a parallel case. Therefore, in some cases their eyesight might be defective." The "Times" has stated that the primary cause of casualties at sea, like those by road on shore, is either the reckless selfishness of Officers in command, or the absence of a proper look-out. The first of these said causes I am not prepared to discuss, but that the second accounts for a very large number of disasters no one who reads carefully the Board of Trade inquiries can deny, and I do not think I am presumptuous in believing that so long as the possi-

bility exists of colour blind men being chosen to act as look-outs, no diminution in the number of shipping disasters can be expected. It was all very well in days gone by, when ships jogged along at 5 or 6 knots an hour, but it is a very different thing now, when ships are going 15 or 20 knots. Then, when a light was sighted, there was time for half a dozen men to look at it; now, no sooner is a light seen on the horizon than it is passed, and unless a man has a perfect vision, both for form and distance, he is sure to come to grief sooner or later. The Royal Commission which sat recently on the loss of life at sea, in one of its conclusions made the remark that "it was the duty of shipowners to select competent men and Officers." Now I ask what more incompetent men could be shipped than defective sighted men and colour blind men? It is a fact, as Mr. Brudenell Carter has told us, that there are $3\frac{1}{2}$ or 4 per cent. of the whole male population colour blind. It is also a fact that 8 per cent. of the total population suffer from some refractive error. It is a fact also that a certain proportion of sailors suffer from blindness due to disease of the eyes, and yet these men are shipped and not the slightest notice taken of their vision. This Commission made the remark that it was the duty of the shipowner to see that the men were competent. In that remark I do not agree. I do not think it is so much the duty of the shipowner. It is the duty, and one of the first prerogatives of the Legislature, that it should provide for the safety of its subjects, and it is the Legislature's business to see that sailors who are allowed to be look-out men, and to whom they give certificates for masters and mates, should be thoroughly competent. Knowing that there are a large number of accidents due to "unknown causes," are we therefore unreasonable in thinking that some at least are due to defective vision and defective colour sight? I should like to mention a few cases. I know a case of a man at the present moment who has been operated upon for cataract, and who is in command of his vessel. He can scarcely see a haystack passing along the road without his glasses. Is he a competent sailor? Possibly this cataract case is the one mentioned by a gentleman who was on board the "Warrior," and who, in writing to me, said: "I am collecting evidence of colour blindness and defective sight, and in my humble opinion defective vision is more prevalent than is at all supposed. Why I once lodged with a sea captain who had lost his vessel in collision with another, and I soon found that he was almost blind, though to a casual observer he appeared to see well." I mention the following case of colour blindness in a boy, not on account of the colour blindness, but for another reason. The lad is green blind. He had been to sea for four years; he was then sent to a coach, who said he was colour ignorant, and that he was quite able to carry on his sea profession. I mention it because the father, whom I have not examined, was in command of a vessel which came into a very terrible collision, and caused the loss of a great many lives some years ago. Seeing that the son is colour blind, the father may be in a like condition. The following case, related in the lad's own language, shows well the dangers run in employing short-sighted sailors: "On the last voyage I found, when steering the ship close hauled to the wind, I could not see the clew of the royal properly. I never did regular steering before that voyage. During the first voyage I did no look-out duty, but during the last I have done regular look-out duty. When my companions were able to see a ship on the water and the sail she was carrying, I could just see a speck, that it was a vessel and no more. When steering and unable to keep the vessel up to the wind, I was spoken to by the master in such terms as, 'You are asleep, and you are dreaming and not attending to your work.' " The lad wanted to give up the sea. He was apprenticed to some shipowner for five years. I wrote a certificate, and told the shipowner he was totally unfit to go to sea. The lad had paid 20*l.* or 30*l.* to be apprenticed. He had only been two years and ten months in his apprenticeship, but the shipowner, to his disgrace be it said, refused to refund any portion of the money, and compelled him to remain on board the vessel. The next case shows clearly the dangers run, and proves our statement that there are colour blind men at sea. I quote now from the "Liverpool Daily Post" of December 4, 1888. "Sir,—Having seen in your issue of the 14th an article on Colour Blindness, I beg to state my case, which I consider a hard one. After serving as apprentice

for four years with Messrs. T. B. Royden and Sons and J. B. Walmsley and Co., and afterwards as A.B. in steamships, I prepared myself for the Board of Trade examination, but failed in colours. To use a nautical phrase, I am thrown on my beam ends, for I have now been two months ashore without being able to obtain a land situation. I write this hoping it will prove a warning to all young fellows about to enter on a sea life, not to do so until they have first had their eyesight tested, also hoping it may meet the eye of some gentleman who could help me to a situation, which I am very much in want of. Unless I can hear of something I shall have to go to sea again in order to support myself. Yours truly, R. P. THOMPSON, 44, Tintern Street, Walton." Nearly twelve months later I wrote to this gentleman, and received the following reply:—"August 10, 1889. I am going to sail to-morrow in the s.s. 'X——,' for Rio de Janeiro, and expect to be away about three months." Comment is unnecessary. I have said quite sufficient to show that there are a number of colour blind and defective far-sighted men in the mercantile marine, and that a great number of accidents are due to colour blindness and bad far-sight. With regard to the case mentioned by Admiral Bowden-Smith of the lad with the glass eye, I would like to say this. The Board of Trade did pass a regulation that a man who had a glass eye or a man who had lost an eye could not be a sailor. I wrote to the Board of Trade and asked whether they would have sent Nelson about his business. I do not know whether that had any effect at all—it is very difficult to have any effect on the Board of Trade—but I remember shortly after a regulation was passed that even if a boy had lost one eye if the other eye was perfect he might be a sailor. It might possibly account for the young gentlemen spoken of entering the Service. Lord Hannen in giving judgment in a case of a vessel overtaking and running into another said "a good look-out was not kept on board the 'Essequibo,' but it is to guard against the *defects not merely of mere sight* but of their minds and attention that rule was passed." This shows the Judge evidently thinks that men who are in command of vessels have good sight. I venture to think Lord Hannen gave credit where it was not due. The framers of the rule of the road at sea, scarcely believing in the existence of colour blind sailors, and not at all in short-sighted and blind sailors, cannot have appreciated the dangers of employing either, nor, I venture to think, would their successors be in any more enlightened condition were it not that Dr. Farquharson's action in the House of Commons has been the means of directing public attention strongly to them.

Admiral BOYS: I should like to corroborate what Admiral Bowden-Smith has said about the colour blindness of boys, who are medically examined for the Marine Society's training ship "Warspite." I think more rejections arise from ignorance of the names of colours than from actual colour blindness. With regard to accidents from collisions there is a cause for some collisions which may have been attributed to colour blindness, and which has happened within my own knowledge, viz., that the red and green lights have been transposed, and put on the wrong sides of ships. You can imagine that in the confined space of the fore-castle of a merchant ship, where the lamps are lit and trimmed, by accident or carelessness, it happens that the green light is put into the red box and the red light into the green box. I believe that has been the case in some collisions, which have been put down to colour blindness or other causes.

Mr. BICKERTON: I should just like to say that the Board of Trade have never taken any notice of this question of colour blindness in inquiries held until the last few weeks, when, in the inquiry held with regard to the stranding of the "Violet," the Justices said: "There is one circumstance which the Court wishes particularly to call attention to. After the close of the inquiry, and the respective certificates had been given up in the usual way, it was subsequently found that the mate's certificate bore the memorandum in red ink, 'This Officer has failed to pass the examination in colours. (Signed) J. CLARK HALL, Registrar-General.' On the face of it, and without some explanation, it seems a most undesirable and reprehensible thing that a master's certificate should be granted to a man who is apparently unable properly to distinguish colours. The danger of entrusting the command of a vessel to such a man is too obvious to need further comment. And, assuming that a correct register of certificates granted be kept, then the Board of

Trade's solicitor conducting the inquiry should have been instructed on the point, in order that he might bring to the notice of the Court the fact, as, under certain circumstances, it might have had an important bearing upon the subject of the investigation." It is the first time that the Justices appointed by the Board of Trade have ever, in any judicial inquiry, taken any notice of colour vision, and the condemnation of the Board of Trade by their own representatives is well warranted and well deserved, and I hope all interested in the subject will make every use of this quotation, for it deals a death-blow to the existing regulations, and to the masterly inactivity of the Board of Trade on this subject.

Admiral BOWDEN-SMITH: My boy that got in with the glass eye had nothing to do with the Board of Trade—he got into the Navy.

Mr. BRUDENELL CARTER: I have very few words to say in reply to the questions which have been asked me. Admiral Bowden-Smith appeared to attribute all colour blindness to ignorance, and inquired whether I personally knew instances of colour blindness in educated people. I know myself two Fellows of the Royal Society who are unable to distinguish red from green, and who state that they cannot tell the different railway lamps one from another. A lady of title wrote to me the other day giving me pedigree illustrations of colour blindness in her own family, which had come down through three or four generations. It is impossible to distinguish between colour blindness and colour ignorance when names are used. To ask a boy the name of a colour, throws no light whatever upon the defect of his colour vision, and nearly half the mistakes made by imperfect methods of examination have been due to the introduction of nomenclature in inquiries in which nomenclature had no bearing whatever upon the facts. The question of attempting to use different colours for signal lights has been investigated again and again, and in the report of the Royal Society Committee, Captain Abney has given the luminosity as intercepted by various coloured lights, and has shown that blue is wholly unsuitable for the purpose. He has shown that we are practically tied down to red and green, and that to take any different colours would be to sacrifice the great majority of the colour sighted to the very small minority of the colour blind. Captain O'Callaghan has not quite, I think, followed the recent developments of the constitution of light and colour. Our Chairman will be so kind, I think, as to show upon the screen the yellows produced by the mixture of red and green, and I daresay he will be so kind also as to show that not green, but white, is produced by the mixture of yellow and blue, yellow containing the red and green. A different effect takes place in the paint box, but that depends on a wholly different principle, one which is very easy of explanation, but which would take up too much of your time if I were to attempt to explain it now. As a matter of fact, the primary colours are red, green, and some shade of blue, and by the combination of those three, white can be produced immediately. By the combination of red and green the various shades of orange and yellow can be produced, according as one colour or the other predominates. I do not think any further questions have been asked me. I can only return you my thanks for your kind attention.

The CHAIRMAN (Captain Abney): It is my duty to sum up the discussion. There was one remark that Mr. Brudenell Carter made during his lecture to the effect that we had not yet been able to find a thoroughly investigated case of a man who saw only in one colour. I have been the happy examiner of three such cases. I know of two brothers who certainly only see mono-chromatically, and the sensation they have is that of violet. Only yesterday and the day before, owing to the kindness of Mr. Nettleship, a patient was sent to me to examine, and I had the satisfaction of finding a case whose vision was also mono-chromatic. He could see but in one colour, and his was a green sensation; both the red and the blue sensations were absent. In the other case the green and the red sensation were absent. I look forward to the time when a patient will be found in whom the green and blue sensations are absent, and who will see with the red sensations alone. We shall then have three distinct types of mono-chromatic vision which, if combined together, would give normal vision. I thought it might interest the meeting to see the matches which the green mono-chromatic vision patient made. Skeins of a variety of colours of Berlin wool all proved to appear to him of the same colour when put in a heap. When asked "Is there any difference between them?"

the patient said, "There is no difference at all except that some are darker than others: they are all of the same colour." This patient is a very good example of passing into the mercantile marine without proper colour examination. He was on board the "Conway" training ship, and was passed by a medical Officer as having proper colour vision. The medical Officer does not seem to have known very much about colour testing, for he got three pieces of silk from his wife, and told him to tell him the names of the colours. The boy was cute enough to name correctly enough the red, green, and whatever the other colour was. He was passed as all right. He was next shipped as an apprentice on one of the White Star vessels, and in nine months more he would have completed his apprenticeship, and then would have gone up for a certificate as mate. He happened, however, to be on a voyage in the Pacific, and was on the look-out when a vessel chanced to be sighted in the distance. He called to the Officer on the bridge, "Green light ahead!" The Officer immediately took his telescope and said, "No, my lad; it is a red light." "Oh, no, sir; it is green." The Officer told him he must be colour blind; but the lad informed me he thought it was the Officer's sight which was in fault. Naturally he was never allowed to go on the look-out again, and when he came back he was examined by Mr. Nettleship, who found him absolutely colour blind. Yesterday I examined him, and I found, as I have stated, that he had only mono-chromatic vision. No wonder he mistook the signal light, for any colour would be the same to him. His is a hard case, for he had passed through a training ship undetected, and was very nearly fit for passing his examination as mate. I have not the slightest doubt he would have been rejected as regards the colour test, even by the Board of Trade at the present time, as the defect was so very glaring. Still it shows the necessity of having a really good test previous to a boy entering upon a career of that description. With regard to the suggested use of a blue light for signal lamps, it is impracticable. If a blue glass were employed which was sufficiently coloured to appear blue and not white, when an oil light is behind it, it would cut off at least 95 per cent. of the light in a clear atmosphere, and in a fog a great deal more. Even the Navy red glass which is used cuts off 90 per cent., and the green glass from 50 to 75 per cent., and these will carry much further in a fog than the blue. I am not at all surprised at the experience of Admiral Bowden-Smith about the mauve glass which appeared to be red when it got to any distance. The atmosphere if at all turbid will cut off a great deal more of the blue rays than the red. The consequence is the blue from the mauve disappears, and the red is left behind. There have been a variety of stupid suggestions made from time to time in the public prints with regard to making a change in the colours of signals. There is one gentleman who ought to have known better, one of the medical profession, who writes and recommends that the signals should be orange and blue for certain theoretical reasons, which, by-the-bye, are open to more than a good deal of doubt. Now orange in the spectrum you cannot distinguish from the colour of an oil light. A blue light, as I have told you, is absolutely inappreciable, on account of the small luminosity it has in foggy weather. Therefore the suggestion that orange and blue could be employed must be dismissed as worthless. The quality of the green glass, it seems to me, is, however, of the greatest importance. With a yellow-green light anybody who is even slightly colour blind might mistake the light coming through it for a white at some time or another, and it may be that an accident will occur through its not being suspected. A proper shade of green to employ is that which is used in the Royal Navy, and I believe to be the best signal glass which can be used. I was surprised to hear Admiral Bowden-Smith say that boys are rejected not only for colour blindness, but also for colour ignorance.

Admiral BOWDEN-SMITH: For eyesight altogether.

The CHAIRMAN: The question of colour ignorance does not enter into the Holmgren test at all. We have it on evidence before the Committee of the Royal Society that colour ignorance is not unknown in some districts of England. Yokels from these parts may be absolutely unable to tell the names of colours. Of course that is a defect which can be remedied by tuition. They can eventually learn the names of colours, but colour blindness is absolutely incurable. You will at once understand that colour ignorance does not enter into the test for colour blindness when

matches of colours are made and the naming of colours required. Of course they might make a mistake, but the examiner would see at once whether it is due to not understanding or to real colour blindness. The way in which a patient treats the heap of wools is a great aid to the examiner. For instance, the day before yesterday I had a patient who was put through the Holmgren test. He did not pass it for the sole reason that he hesitated in making his matches. He picked up the wrong colour to match with a green and set it down again, but he again picked it up and again rejected it, and though he made correct matches in the long run, after a vast amount of hesitation in some few instances, yet I rejected him. I next examined him by the spectrum test, which is infallible, and at once confirmed the diagnosis one had made with the Holmgren test. Such kinds of facts indicate, I think, that the recommendation made by the Royal Society Committee that the Holmgren test should be employed is a very sound one, and one which cannot be gainsaid. As regards the necessity of efficient colour testing, I may say that Mr. Brudenell Carter really set the ball rolling. In a series of lectures that he gave some time ago at the Society of Arts, the whole question of colour blindness was brought forward most ably. The seed sown by those lectures seems to have taken root and fructified. New methods and new theories have since then been brought forward, all helping forward what Mr. Brudenell Carter had in view. Finally, the Board of Trade, in response to Mr. Brudenell Carter's persistency, asked the Royal Society to appoint a Committee to consider the whole question. This, I am glad to say, has been done, and the Committee has reported. Both of us are on that Committee, and I can only add that Mr. Carter has given most efficient assistance to it, owing to his thorough practical knowledge of the subject. I am sure I shall be quite right in asking you to pass a vote of thanks to Mr. Brudenell Carter for his lecture to-day.

SPECIAL GENERAL MEETING.

June 27, 1892.

FIELD-MARSHAL HIS ROYAL HIGHNESS THE DUKE OF CAMBRIDGE,
K.G., &c., &c. (President), in the Chair.

THE Secretary (Captain Burgess) read the notice convening the meeting.

The Secretary then read the report of the Special Committee as approved by the Council at their meeting on the 20th June, as follows:—

REPORT OF A SPECIAL COMMITTEE *appointed by the Council of the Royal United Service Institution, on the 31st May, 1892, for the purpose of drawing up a statement of the circumstances under which it is proposed to transfer the Institution from its present to new premises in Whitehall.*

Committee.

General G. ERSKINE, V.P., *Chairman.*

Field-Marshal SIR J. L. SIMMONS,
G.C.B., V.P.

Admiral SIR E. FANSHAWE, G.C.B., V.P.

Admiral H. BOYS, V.P.

General J. T. WALKER, C.B.

Lieutenant-Colonel T. H. BAYLIS, Q.C.,
V.P.

Captain W. H. FAWKES, R.N.

The Committee assembled on the 9th June, 1892, and by adjournment to Thursday, 16th June, and having given due consideration to the subject referred to them, now submit to the Council the following statement:—

The present premises of the Institution consist of two houses, which are the property of the Crown, the Institution being merely a tenant at will. In 1871 it received notice to quit, and, although the removal was not then enforced, it became thenceforward the anxious endeavour of the Council to find suitable accommodation elsewhere. In this they were unsuccessful until 2nd December, 1890, when the Queen was graciously pleased to grant to the Institution the use of the Banqueting House, Whitehall, as a mark of Her Majesty's appreciation of the usefulness of the Institution in connection with the Naval and Military Services. The value of this grant was very great, but as the conditions on which it was made precluded the possibility of adapting the building to meet all the requirements of the Institution, the Council represented to the Government that additional accommodation would be wanted, and that this might be obtained by utilizing the site of Dover House Stables, which is Crown property, and adjoins the southern end of the Banqueting House. Since that time there has been an interchange of communications between the Council and the Treasury on the subject, but no definite arrangement

was arrived at until the 25th May, 1892, when the Chancellor of the Exchequer stated in a letter to the Chairman of the Council that the Institution might have a building lease of Dover House Stables for eighty years at a rent of £350 for the first year and £580 afterwards, subject to the Office of Works having control over the design of the building. This statement of the terms on which the Institution could obtain the site of the stables was accompanied by a repetition of an intimation which had been previously made, that the present premises of the Museum of Practical Geology in Jermyn Street might become vacant, in which case they might be allotted to the Royal United Service Institution. The Council had thus to balance these two alternative schemes for housing the Institution, the one against the other.

It was found that in respect of the cost of maintenance, which would in each case have to be met, there was a difference in favour of the Jermyn Street scheme, but nevertheless, after mature consideration, the Council came to the conclusion that the preponderance of advantage was on the side of the Whitehall scheme; the reasons which led to this view being:—

1. The locality in which the Banqueting House is situated is one of the best in the metropolis, and in every respect preferable to Jermyn Street.
2. The beautiful façade of the buildings and the historical interest which attaches to it, although of course not essential to the prosecution of the work carried on by the Institution, would nevertheless conduce to its prestige, and on that account should not be overlooked.
3. Possession can be obtained of the Whitehall premises at once, whereas in the case of the Jermyn Street building, it has been ascertained that the Geological Museum may not be removed from it for an indefinite period, and meanwhile some unexpected difficulties may very possibly arise which would interfere with the claims of the Royal United Service Institution to occupy the building on its becoming vacant.

On referring to the annexed paper (B), which shows the estimated cost of carrying on the administration of the Institution in the event of the Whitehall scheme being adopted, it will be observed that there will be an annual deficit of £792. It therefore becomes necessary to consider what prospect there may be of increasing the funds sufficiently to make the two sides of the account balance each other. It has been suggested that a source of income might be derived from instituting a charge for entrance to the Museum, but the proceeds of such a charge might not be more than enough to cover the extra cost of keeping up the Museum in a greater state of completeness than that in which it has been for some time past, owing to the uncertainty of the position of the Institution.

There is, however, good reason to hope that when adequate accommodation has been procured, and all the improvements in the administration of the Institution, which are at present in contempla-

tion, have been brought into operation, there will be an accession to the number of its members, and that the consequent increase of subscriptions would remove all difficulty in defraying the additional expenditure which would result from the change of premises. When it is borne in mind what a large number of names there are on the active and retired lists of the Navy and the Army, including the Auxiliary Forces (about 32,000 in all), it must be admitted as strange that not more than some 4,000 Officers have considered it their duty or privilege to be members of an Institution from which both Services have derived the greatest possible benefit.

(Signed) GEORGE ERSKINE, *Chairman*.

16th June, 1892.

(On behalf of the Committee).

Appendix A.—Rates and Taxes in present and proposed Buildings.

- „ B.—Estimate of Expenses, Whitehall Scheme.
 „ C.—Estimate of Expenses, Jermyn Street Scheme.
 „ D.—Estimate for Removing.
 „ E.—Estimate for New Building.
 „ F.—Funds of Institution.
 „ G.—Schedule of Accommodation.

A. RATES AND TAXES.

PRESENT BUILDING.

Valuation { £700 gross.
 £584 rateable.

	£	s.	d.
Rates	143	11	4
Water rate	19	18	0
Taxes	62	14	2
	<u>£226</u>	<u>3</u>	<u>6</u>

WHITEHALL SCHEME.

Valuation { £1,500 gross
 £1,250 rateable } Banqueting House.
 Valuation { £1,460 gross
 £1,217 rateable } New Building.

	£	s.	d.
Rates, Banqueting House.....	296	17	6
„ New Building.....	289	0	9
Water rate, in proportion.....	84	1	2
Taxes, in proportion	265	3	4
	<u>£935</u>	<u>2</u>	<u>9</u>

JERMYN STREET SCHEME.

Valuation { £2,700 gross.
 £2,250 rateable.

	£	s.	d.
Rates	450	0	0
Water rate	39	15	0
Taxes, in proportion	241	17	6
	<u>£731</u>	<u>12</u>	<u>6</u>

B. ESTIMATE OF ANNUAL EXPENDITURE.

WHITEHALL SCHEME.

<i>Income.</i>		<i>Expenditure.</i>
Average Income of the Institution for the last 8 years	£5,151	Ground rent..... £580
Less dividends on Capital Expended in New Building.....	600	Rates and taxes..... 935
	—	Lighting (say) 100
	£4,551	Maintenance (say) 150
Balance, estimated Yearly Expenditure in excess of present Income.....	792	Insurance (say)..... 29
		Average expenditure of the Institution for the last 8 years £4,133
		Less Expenses, old Building, viz. :—
		Rent £200
		Rates and taxes..... 226
		Lighting 41
		Maintenance..... 100
		Insurance..... 17
		— 584
		— 3,549
	£5,343	£5,343

C. ESTIMATE OF ANNUAL EXPENDITURE.

JERMYN STREET SCHEME.

<i>Income.</i>		<i>Expenditure.</i>	
Average Income of the Institution for the last 8 years ..	£5,151	Rent	£870
Balance, estimated Yearly Expenditure in excess of pre-		Rates and taxes	731
sent Income.....	268	Lighting (say)	100
		Maintenance.....	126
		Insurance (say)	43
		Average Expenditure of the Institution for the last 8	
		years	£4,133
		Less Expenses, Old Buildings, viz.:—	
		Rent	£200
		Rates and taxes.....	226
		Lighting	41
		Maintenance	100
		Insurance	17
			584
			3,549
			£5,419

D. ESTIMATES FOR REMOVING.

The Committee applied to Mr. Taylor, Pimlico, and to Mr. Crow, who has been employed for years by the Institution, to supply estimates as to the probable cost of moving the contents of the Institution to the Banqueting House and to Jermyn Street, and received the undermentioned :—

MR. TAYLOR'S ESTIMATE.

About 40 van loads, at £3 per load	£120
Taking models to pieces and putting them together again, about	90
Removing models, about 8 van loads at £3 each.....	24
	<hr/>
	£234
	<hr/>

The same charge for moving to Jermyn Street.

MR. CROW'S ESTIMATE.

70 loads, at 17s. 6d. per load	£61	5
Moving models to Banqueting House, about.....	100	0
	<hr/>	
	£161	5
	<hr/>	

The extra charge for moving to Jermyn Street would be fully covered by £50.

N.B.—In addition to the above charges for removal there will be considerable expense, which it would be at present impossible to estimate, in arranging the articles in the Museum and in the repairs of cases and furniture; this cost would be about the same in either scheme.

E. ESTIMATE FOR NEW BUILDING,

SUPPLIED BY MESSRS. WEBB & BELL.

New Building, Portland stone front, facing White- hall.....	£18,500
Lining walls of Reading Room with plain oak shelving	600
Connecting Banqueting House to New Building, open- ing out ground floor windows at present blocked up, putting suitable plain oak bookcases in gallery	700
Installation of Electric Light (500 lights)	1,000
	<hr/>
	£20,800
Architects' Commission at 5 per cent.	1,040
	<hr/>
	£21,840
	<hr/>

F. INVESTED FUNDS OF THE INSTITUTION.

AVAILABLE FOR BUILDING PURPOSES.

	Stock.			Present	Market value.		
	£	s.	d.	price.	£	s.	d.
Consols, 2¾ per cent. ...	16,655	1	11	97	16,155	8	11
India, 3½ per cent.	2,028	17	8	107¾	2,186	2	4
India, 3 per cent.	2,019	5	7	97½	1,968	16	4
Nottingham Corpora- tion, 3 per cent.	1,239	3	5	97	1,201	19	11
	<hr/>				<hr/>		
	£21,942	8	7		£21,512	7	6
	<hr/>				<hr/>		

G. SCHEDULE OF ACCOMMODATION.

PRESENT BUILDING AND WHITEHALL SCHEME.

Schedule of Accommodation provided in the present Building in Whitehall Yard and in the Banqueting House and proposed new Building on the Site of Dover House Stables adjoining.

	Whitehall Scheme.					
	Present Building.		Banqueting House.		New building on Stable Site.	
	Floor space in feet superficial.	Wall space in feet superficial.	Floor space in feet superficial.	Wall space in feet superficial.	Floor space in feet superficial.	Wall space in feet superficial.
Museum	11,277	14,979	14,721 This includes 5,000 feet of poor accommodation in basement, 1,570 in galleries, and a possible 2,000 in annexe at north end	11,800 Of which 5,000 is above the gallery level	—	—
Library	2,612 Including reading room, 432	2,690 Including reading room, 540	—	—	2,610 Including writing and smoking rooms, 860	3,310 Add 1,530 if back wall of theatre is used for books; add 2,560 if book store is constructed on top floor.
Theatre	1,180	—	—	—	2,000	—
Galleries	550	—	—	—	1,512	—
Official	2,276	—	—	—	3,041	—
			14,721 9,163	11,800 7,400	9,163 —	7,400 —
Totals	17,895	17,669	23,884	19,200	—	—

ASTON WEBB & E. INGRESS BELL, Architects.

JERMYN STREET SCHEME.

Museum	14,337	feet superficial.
Library and Office Room	5,416	„
Theatre	2,397	„
	<u>22,150</u>	

Approved by Council, 20th June, 1892.

H.R.H. THE DUKE OF CAMBRIDGE : I must in the first place apologize to this meeting for having been the cause of the change of hour from 3 to 12. I only hope that the change has not been very inconvenient to most of those whom I see around me, but it was a matter of duty which was not known to me when the meeting was arranged for 3 o'clock ; and I am sure you will agree in thinking that I have done a right thing in asking you to come early in order that I might be able to preside on this important occasion (cheers). Gentlemen, we have a very delicate task to perform to-day ; we have to look to the interests of an Institution which I think is of the greatest possible advantage in more ways than one. First of all the march of intellect is increasing in every walk of life, and it would be a melancholy thing if, at such a moment, this Institution, which I believe to be of great value to the two Services, should be lost to the country for the want of funds (cheers). In the next place, I think it is of great advantage that the two great elements of power in the State, the Naval and Military, should be brought together, whenever it is possible, to interchange the thought, feeling, and sentiment which, after all, constitute the mainspring of the defensive power of this country. I consider that the discussions which take place in this Institution, and the possibility of the public interchange of thought which this Institution affords, is of the greatest advantage both to the Navy and to the Army (cheers). Therefore, I cannot doubt that everyone here will wish with me that we should endeavour, to the fullest of our ability, to continue the value and advantage of this Institution (cheers). But the question to-day is really one absolutely of finance. The whole subject is one of great difficulty and delicacy. I own, when first it was brought to my notice, I was strongly under the impression that the Jermyn Street was the best site we could have under the circumstances. I admit that the site here is very preferable, but looking at the Jermyn Street site as an existing institution where we should not have had to put our capital into the ground, so to speak, we should have done better financially than probably we shall be able to do under the present circumstances. But the moment I was told that the Jermyn Street site was, after all, a doubtful one, and that we might not get it at all, and then we should certainly have lost this, I confess I absolutely changed my opinion, and now I am entirely in favour of following the recommendations of the Council (cheers). The details have not been read to you, and perhaps I ought not to be the first to go into them, because probably my friends on both the right and the left know a great deal more about them than I do ; but, at the same time, it is very clear that our small capital, which at present is very small, will have to be sunk for building purposes. That is a very grave and serious matter, and all the more so when, as a result, you will find that there will be an absolute deficit of nearly 800*l.* a year. The only way to meet that naturally would be a very much larger amount of subscriptions, and I do agree with the view adopted by the Council ; and the Council certainly, if I may be permitted to say so—and I think you will agree with me—have written a most excellent report, which has made clear to everybody how the condition of things at present stands, for which we ought to be very much obliged to the Chairman and members. I think they have clearly made out that we may expect a very much larger amount of subscriptions, both from the Naval and Military Services, than we at present have had. I cannot suppose it doubtful that the very fact of having now this large and fine hall granted to us, with the accommodation which is

intended to be added to it, will attract for us a great deal more notice and attention; but, even from a feeling of duty to their own cloth, naval and military, I do hope sincerely that a very large number of both Naval and Military Officers who, up to the present time, have not subscribed, will subscribe in order to keep so valuable and useful an Institution to both Services in that condition in which we wish to see it. These are the only remarks which I consider it right to make. I hope you will understand that I do not venture to offer more than my own opinion, but I have a strong opinion; I have given my reason for that opinion, and I hope that those who follow me will go into those necessary details with which I feel I am personally hardly able to deal. I thank you for having listened to me, and will now call upon the Chairman of the Council to move the first resolution (cheers).

Admiral Sir GEORGE WILLES, G.C.B. (Chairman of the Council): Your Royal Highness has said so much, and so much to the purpose, that really there is very little to be said by me as Chairman of the Council. Besides that, gentlemen, you have in your hands the excellent report of the Special Committee. For months, for years, I may say, there has been constant discussion as to what should be done about the future of this Institution. A few months ago the Council were told confidentially that we probably might have the Jermyn Street Museum, but it was to be kept secret. We were not allowed to tell the Annual General Meeting in March anything about it; whilst outside it was an open secret. At last the Chancellor of the Exchequer was good enough to remove the restriction; then we discussed the matter, and after anxious consultation, and having found from proper authority that we could not get the Jermyn Street site under five years and perhaps not at all, the Council came to the unanimous decision that it would be better to face this very grave question and take the Whitehall site. For my part, I believe it is a right decision on the whole. If we could have gone into Jermyn Street immediately, well and good. Of course, the question of finance is a serious one, but I, for one, do not fear the result in the least. My worthy friend, the Chairman of the Naval Exhibition, whom I see present, will well remember that it was proposed to the Executive Committee to spend 8,000*l.* on the "Victory" and the lake. They were staggered, but Sir George Chubb, who had had a great deal to do with exhibitions, and was our Chairman of the Finance Committee, said, "Gentlemen, the more money you spend, the more you will bring in. Make the place attractive and the people will come." What was the result? A surplus of 47,000*l.* Well, I say, in the present case there is no doubt ours will be a most attractive site, and it will draw money. The gallant Field-Marshal, Sir L. Simmons, is very sanguine that we shall derive funds by entrance money to the Museum, but what is it we really want? A thousand extra subscribers, or an increased subscription on the part of the present members (cheers), and, perhaps, from those about to join. I am certain everybody present will, if we carry the point to-day, immediately increase his subscription. For my own part I shall double mine at once. The ways and means are really in the hands of the Council. By the Charter they have the management of the funds of the Institution. The concluding words of the resolution that I shall have the honour to move are "and that the funds of the Institution be made available for that purpose." That is so. The General Meeting is to give us directions, but the Council are responsible for the management, and I say on the part of the Council, certainly of a very large majority, we do not fear the result in the least. In anticipation of your decision to-day in favour of the Council's scheme, we have already called a Council meeting for next Wednesday to take immediate action. It is to be remembered that the building will take two years to complete, in other words, we shall not sink all our capital under two years. That gives us ample time to raise funds; and I really think it would be a great discredit to the two Services if we cannot in the meantime increase our members by a thousand. In the last paragraph of this very able Report of the Committee, of which General Erskine was the Chairman, they point out what is almost incredible. I read, "When it is borne in mind what a large number of names there are on the active and retired lists of the Navy and Army, including the Auxiliary Forces (about 32,000 in all), it must be admitted as strange that not more than some 4,000 Officers have considered it their duty or privilege to be members of an Institution from which both Services have derived the greatest

benefit." I distinctly promise, on the part of the Council, if you will approve of our proposal to-day, that the administration shall be a vigorous one. Cobwebs there are plenty, and they must be swept away. As a general rule, new measures require new men, and I repeat that if you will only confide in us, we will carry out in an energetic way the proposal now laid before you, and which looks at present rather a serious one. The resolution I have to move is, "That this meeting do adopt the Whitehall scheme as recommended by the Council, and that the funds of the Institution be made available for that purpose."

General Sir F. C. A. STEPHENSON, G.C.B. (Vice-Chairman of the Council): Your Royal Highness, my lords, and gentlemen, I have great pleasure in rising to second the proposal of the Chairman, and, in doing so, I venture to say it seems to me that we have really practically no option in the matter. Members of this Institution recollect very well the difficulty we have been labouring under in getting a suitable site to replace this one. We have gone constantly to different Governments, Chancellors of the Exchequer in particular, but without any favourable result up to the present. But, gentlemen, there is one point that I wish to call attention to, and that is this. Who was it that in our need was the first to come to our help? It was Her Majesty the Queen. That is one reason why I think, practically, we have no option in the matter but to accept this site. There were difficulties in the way, inasmuch, as you all know, there was not sufficient accommodation. Consequently frequent appeals have been made to the Government so give us additional assistance. The Government have acceded at last, so that at the end of twenty or thirty years we have got that which we have been striving for strenuously during the whole of that time. Surely we should be stultifying ourselves if we did not take advantage of the present state of things and accept the offer which Her Majesty and Her Majesty's Government have so liberally made to us! There is, of course, one point to which one cannot shut our eyes, viz., the increase of expenditure that will fall upon us; but in carrying out the remarks of His Royal Highness and of the Chairman as to the way in which that is to be met, I venture to think that we should adopt the principle of "nothing venture, nothing have." I do not think the "venture" will be very serious, and I am sanguine enough to believe that the results will be very satisfactory. On these grounds I venture to second the resolution, which, I hope, will be adopted by this meeting.

General Sir REDVERS BULLER, V.C., K.C.B.: I shall be sorry, your Royal Highness, if anything I say may at all prevent anybody from voting for the removal of this Institution to the Banqueting Hall, and the site which is offered to us; at the same time I think that we should do so with our eyes open. I cannot myself accept the figures that have been given to us as quite accurate, and I believe the loss of income will be nearer 2,000*l.* a year than 1,000*l.* I do not think that it would be fair on the meeting to let them vote on such a subject without a full appreciation of what are, by some, at any rate, believed to be the true facts of the case, and with your permission I will read to the meeting a letter I received this morning from a gentleman whose name I will give. He says: "Owing to pressure of business, I have only to-day looked through the Report of the Special Committee appointed to consider the removal of the Institution to the new premises. I observe that the Committee estimate that if the Whitehall scheme be adopted there will be an annual deficit of 792*l.* I fear, however, that this sum will be far below the actual deficit, and I base my opinion upon the following grounds:—

(1.) The electric lighting. An installation is proposed for 500 lights, the candle power of which is not stated. It is, of course, impossible for me to make any exact calculation of the annual cost of this installation without having complete figures as to the hours during which the light will be burned. The sum put down by the Committee is 1,000*l.* Even if the lights are only 8-candle power, which is most unlikely, I have no hesitation in saying the annual cost will be several times as great as that estimated. You are, of course, aware that I have exceptional experience on this subject" (he is chairman of the St. James's Electric Company).

"(2.) The maintenance of building. The annual expenditure under this head is 150*l.* It seems to be based on a present expenditure of 100*l.* in respect to the existing building. Let me first of all point out the existing building can scarcely be said to be maintained at all, so that you can form no basis of calculation. It is

proposed to erect structures at a cost of 18,500*l.*, in addition to the Banqueting Hall. Such a range of buildings will require a much larger sum than 150*l.* a year to maintain. These are two heads only of those under which I believe expenditures to have been under-estimated, but there are several others for which an insufficient allowance appears to have been made, and I believe I am within the mark when I say that the annual deficit is likely to be a sum at least double that estimated by the Council. I am, &c., EUSTACE BALFOUR, M.R.I.A., and Major London Scottish Rifle Volunteers." I was asked to read that letter, and I did not think I was justified in refusing. And I may add to his statement another possible extra expense. I know a bank on the opposite side of the way had an enormous expense with their foundations, owing to the quantity of water there was, and I see no estimate for the allowance of any chance of extra expenditure in the foundation of these new buildings. I do not wish at all to appear as opposing this scheme, for I am in favour of it, but I think it right all should know that there are these matters to be considered. It is far better for us to face our difficulties fairly at first, and to take measures to obtain sufficient funds, than to find ourselves in want of them when half way through the work.

General ERSKINE: Your Royal Highness and gentlemen, with regard to what has fallen from Sir Redvers Buller, and what his informant and critic of our financial statement has said, I beg leave to state that we went into the matter very thoroughly. We got all the information we could with regard to the items which have been questioned, and I think that the figures given are pretty nearly accurate, but of course it is impossible at this present time to foresee all that may happen hereafter. A question has been raised about the foundation. That is a very serious matter, but I beg leave to state that, after consultation with our architects, we have not taken that matter into account. There is every ground for hoping that the foundation of the new building will be good and substantial, and will not give rise to any trouble. Of course, if it does, we shall have to meet a considerable extra expenditure, but nobody can foresee what it may be. We know that Messrs. Cox and Co., when they raised their new building, had a great deal of trouble with their foundation, and consequent expense. Whether that will be our lot or not it is impossible for us to say. I think you may, however, rely upon the outline of our estimate of expenditure as being nearly correct. We have taken a great deal of trouble about it. We have consulted different people who were likely to give us sound information, and I do not think it will be exceeded very greatly.

Colonel YOUNG: With the permission of your Royal Highness, I should like to follow with some remarks on the line taken by Sir Redvers Buller, though from a different standpoint. At the outset I desire to state that I believe the Council are to be congratulated on having adopted the Whitehall scheme, and I also believe that with courage and prudence the object to be desired can be attained. I think, however, that the estimate on which the adoption of the Whitehall scheme is based, Estimate B, shows figures which present somewhat of a difficulty in accepting that as an adequate estimate of the deficit to be anticipated. I have examined that Statement B by the estimates of receipts and expenditure which were brought forward at the last Annual Meeting, and though I think and hope it possible that I may be quite in error in my deductions, because we know that figures can be made up so as to explain away anything, I am afraid that instead of the deficit being about 800*l.* we shall be landed in a deficit of about 1,900*l.* General Erskine may, and I hope will, be able perhaps to set the meeting right on the point, and the point can by reference to certain figures be narrowed in this way. I hold in my hands the estimates for the year 1892, which show estimated receipts of 4,715*l.* Now we are going to sink the whole of our capital, 21,000*l.*, which, in the estimates for the current year, was to produce dividends amounting to 620*l.* That brings down the estimated income to 4,095*l.* Then when we turn to the other side of the account—the estimated expenditure—we find it is 4,715*l.* From that I deduct the expenses which will be saved by the transfer to the Whitehall scheme, which are set out in Statement B, 584*l.* That brings it to 4,131*l.* Then you must add the amount of rent, rates, taxes, lighting, and maintenance which appear on the same side of the account in Estimate B as part of the probable expenditure, which is 1,794*l.*; that brings the total up to 5,925*l.* The net estimated receipts I have shown were 4,095*l.*,

so that there would apparently be a deficit of 1,830*l.*, instead of 792*l.* as in Estimate B. But I will go further and compare Estimate B on the basis of the actual expenditure last year, 5,234*l.* If you will deduct from that the amounts transferred to capital account, also cash in hand, namely, 943*l.*, and the amount of rates and taxes on present building, as per Estimate B, 584*l.*, that will make 1,527*l.* together, leaving a sum of 3,707*l.*; then add the new charges for Whitehall scheme as in Estimate B, namely, 1,794*l.*, and you bring the total expenditure to 5,501*l.* If you deduct from this the net total income available, as I have shown, namely, 4,095*l.*, the deficit will apparently be at least 1,406*l.* I therefore think, while, as your Royal Highness said, the whole question is one of finance, that these matters are deserving of some consideration, because it is right that in dealing with a matter of this kind we should go upon definite and clearly ascertained grounds as to probable receipts and expenditure (cheers).

General ERSKINE: With regard to what has fallen from Colonel Young, as far as I could follow him, it appeared to me that he reckons the saving which we have made in our expenditure during the last five years as loss of income.

Colonel YOUNG: I took the actual estimate given in your Annual Report. I did not go upon anything else.

General ERSKINE: We have taken the average of eight years for income, and also for expenditure.

Colonel YOUNG: I think that is likely to be fallacious.

General ERSKINE: I do not see how we could have done it in a fairer way.

Colonel YOUNG: My point is simply this. We know what we have in hand. I submit that you cannot, in estimating receipts and expenditure, go beyond the facts as they are at present, and which appear in the accounts of last year, and I have therefore limited myself entirely to the facts as given by the Council in their last Report.

Field-Marshal Sir LINTORN SIMMONS, G.C.B., &c.: Your Royal Highness, my lords, and gentlemen, I was one of the Committee that drew up this Report, and, although I did not go into every figure myself, I believe that, generally speaking, the figures are correct. At any rate they are comparative, as to the expense we shall have to incur if we adopt the Whitehall site, and that which we should have to incur if we adopt the Jermyn Street scheme. You will observe the same amounts are put down for lighting and various other items in the one as in the other; and the probability is that any increase that might be incurred on account of any of these items in the one will be equally incurred in the other. But the practical point is really this, that there is a difference of 500*l.* a year in the expenses you have to meet in the Whitehall scheme, as compared with the Jermyn Street scheme. There is a point, however, on which I venture to differ from your Royal Highness, as to the question before us being merely one of finance. I think it is a question of the existence of this Institution. This building is rotten. Looking at those great cracks in the wall before you, it cannot be expected to stand for any length of time; we are, moreover, under notice to quit, and the Government may turn us out at three months' notice. Under these circumstances we cannot do anything to improve the Institution, or to increase its utility. We have been called upon and pressed on all sides at the General Meetings, and urgent demands have been made upon the Council, to increase and improve the utility of this Institution, but the Council are powerless to do anything in this building in this direction; so that, I believe, if we continue in this building for five years the Institution will come to an end. There is no prospect whatever, if we adopt the Jermyn Street site, of our getting it within five years from the present time; for I am told that a building must be erected at South Kensington to house the Museum from Jermyn Street, and when that has been done we may get into it and fit it up; but in the meantime, during the five years, the site adjoining the Banqueting Hall will perhaps be taken up in some other way, and we shall lose one of the finest sites possible (cheers). There is another point which is worthy of consideration. A scheme has been put forward by Sir George Chubb which I venture to allude to as one which, if carried out, will be of the greatest possible benefit to the two Services. It was suggested, I believe, a great many years ago; but at any rate Sir George Chubb has brought it forward again; he has proposed one large building, of which the Banqueting Hall

should be on the one flank, the ground we propose to build upon should be in the centre, and a building on the site of Gwydyr House should be on the other flank, thus making one magnificent United Service Institution, which would be of the greatest possible benefit to the two Services, and of which the Services and the country might be justly proud (cheers). Well, I look upon it that anything we do here may be utilized in that direction, and that what we propose to do, if the members choose to entrust us with the power, would really form a part and parcel of that great scheme whenever it is realized. I think this is a consideration of which we should not lose sight. There is another matter with regard to the stables of Dover House. Discussion has been going on for over a year and a half, and efforts have been made to get possession of the site; we had hoped that the Government would have given it to us, but we must remember that we are proposing to pay the market price that the Government would demand from any other party who might occupy that ground; they let it to us for a ground rent of 580*l.*, and we shall have to meet that rent. It is a heavy ground rent, but I hope that some day or other, if the Government see the great utility of the Institution, and the advantages it offers to the Services, they may possibly reduce the rent, or give us something which will enable us to meet it. I hope and believe that, eventually, the utility of the Institution will force upon the Government the necessity of giving us more assistance; but, even without that assistance, I am most sanguine that we shall make up the full amount we shall require, and that the Institution need not be alarmed as to the difficulty of this work and as to its final success.

Colonel MALCOLM GREEN, C.B.: I should like to ask who will be responsible for the 792*l.* put forward by the Committee as likely to be in excess of our receipts.

Sir GEORGE WILLES: Perhaps Colonel Baylis will answer that question.

Colonel BAYLIS, Q.C.: I have been asked a question with reference to the liability of the Institution as to the probable deficit. Allow me in the first instance to say that I do not expect a deficit. There are two ways of meeting excessive expenditure, one by reducing our expenditure, the other by increasing our income. I believe that we shall reduce our expenses materially with regard to rating. If you look at the estimated rating of this Institution, in the Whitehall Scheme (A) the rates and taxes amount to 935*l.* 2*s.* 3*d.*, the annual deficit being 792*l.*, yet you will find that the Geological Museum is exempted from rating, as well as other like institutions for public purposes, and there are many kindred institutions to our own which pay no rates, the statute 6th and 7th Victoria, chapter 36, exempting institutions for the purposes of literature, science, or the fine arts exclusively, from local rates.¹ Why is this noble and useful Institution "for the encouragement and extension of naval and military science and literature" not to be treated on the same footing? I believe first of all, as I said, that we shall reduce our expenditure in the matter of rating. Allow me another word with regard to the foundations. The foundations were considered (with great deference to General Erskine), because I started that point myself at the Special Committee. I meet it in this way. There is a large massive building still there—the Banqueting Hall; there are the stables where we propose to build, adjoining another large building of the Ecclesiastical Commissioners; all must have suitable foundations. Are we then in any fear at all that our new building will not be supported by the same or similar "sure foundations"? (Cheers.) Add to these that we have now the Thames Embankment, which will keep out the percolation of water, and I think there is nothing to fear on that head. With regard to our reducing our expenditure and obtaining increased subscriptions, I, speaking as a Volunteer Officer, may say that I am proud to be a member of the Institution. It is one of the greatest privileges of my life to be a member, and I say that the Volunteer Forces have a reserve of both men and money on which you may depend. If they do not

¹ Before the granting of the Royal Charter of incorporation "The United Service Institution" was held not to be exempted from rating, as their deed did not relate exclusively to literature and science. Our charter uses the words "Naval and Military Science and Literature," Reg. in St. Martin's-in-the-Fields, 21 Lg. P. M. C. 53, 162 B. 480. However, if unsuccessful in the courts of law we may have recourse to the Legislature to obtain exemption.—T. H. B.

come forward to assist in every way, we shall be ashamed of them. Excuse me for having said by way of preface, so much. Now, with regard to the point on which I was asked to express my opinion as to legal liability, let me say first that we are indebted to the Queen not only for the Banqueting Hall, but also that it was in the 22nd year of her reign, Her Majesty gave us our charter of incorporation by her letters patent,¹ and as a corporate body we are under no individual liability. It can only extend to the funds of the Institution. Of course if any member chooses to pledge his personal responsibility, he can do so. I am sure that we of the Volunteer Forces will assist in this matter. We will come forward with debentures, we will increase our subscriptions, we will do everything in our power. I hope the two great Services will do this likewise, but at any rate I am sure that the Reserve Forces will come forward and do everything to support this noble and useful Institution (cheers).

Commander SULLIVAN, R.N.: I think it is well that you should hear the opinions of one of the poorer and less important members of the Institution. I only joined this Institution a very short time ago, and the reason why I did not join it earlier was that I knew absolutely nothing about it, during the whole of my time in the Service, except that it was generally considered that there were an empty theatre, a musty old museum, and a few ancient books, and it was not until I came here, brought accidentally in connection with the Exhibition, that I knew anything as to what the Institution was. When I saw what it was and knew something about it, I joined it at once, and every day that I have belonged to it I have found that it has been more and more valuable to me. This Institution, I believe, is not going on very well, because of the uncertainty as to what we are going to do. As I said before, I am a poor man, but I should have no objection whatever to give a small donation to increase the funds, and I think that everyone who knows anything as to the value of the Institution will do the same. There are other members who might give thousands perhaps where I give pounds, and if other people will do as much as I am willing to do in comparison, I do not think we shall have any difficulty. But even if we only increase our subscriptions by one-half—I am not a good hand at figures and I do not know much about calculations—but it seems to me that half of 4,000*l.* is something like 2,000*l.* I advocate most strongly going to Whitehall, and I should suggest to all the members present that it very much depends upon them whether people know as little about the Institution as they do at present. During the two years that I have belonged to it, living in a small country place, I have obtained at least two promises to become subscribers by telling them something about it, and I think other people might do the same (cheers).

Lieutenant-General LOWRY, C.B.: I want to make just this remark—I have every confidence that, when the urgency for and importance of the proposed course of action is put thoroughly and explicitly before the Navy and Army, the two Services will rise to the occasion, and that we shall have a greatly increased number of young Officers joining the Institution. But I think it a matter open to gravest question whether, supported, as I earnestly trust this great work will be for the future, far more numerous by Officers of the Army and Navy, it will be possible or well to attempt to double the subscription! Would it not be far better to leave the subscription as it is, and to rely upon Officers of all ranks, when the great future of the Institution—as it is bound to become if we adopt the Council's recommendation to-day, is made plain to them—coming forward in much increased numbers to swell the list of its members? I fear any proposition to double the annual subscription, other than entirely voluntarily, would deter not a few young Officers from joining it at all (cheers). I look upon the Institution as of the greatest possible advantage to the higher education of Officers of all ranks of the Services; and let me include most heartily and most earnestly the grand Auxiliary Forces to which Colonel Baylis has just so well referred. We must do all in our power to get those forces to co-operate with us largely in this work. If they—“*tria*

¹ May a hope be expressed that Her Majesty will have health and strength, and be graciously pleased to open the Banqueting Hall and new buildings, the benefit of which can hardly be over-estimated?—T. H. B.

juncta in uno”—so join with us in increasing numbers, this Royal United Service Institution will have taken a new departure to-day which must tell for all time to the great advantage of the United Services of the country.

Admiral Sir VESEY HAMILTON, K.C.B.: The Field Marshal pointed to the crack in the wall. I hope I am not taking upon myself too much in saying that everybody here present is heartily ashamed of the building we are in.

Sir GEORGE WILLES: With your Royal Highness's permission I may state that I have a letter from Colonel Sir George Walker, A.D.C., who has immediately increased his annual subscription to 2*l*. I think that is a very good example.

The resolution, having been put from the Chair, was unanimously adopted.

General LORD CHELMSFORD, G.C.B.: Your Royal Highness and gentlemen, after the unanimous decision we have come to, I feel sure the resolution which I have now to propose will be received by you in the spirit in which I anticipate it ought to be. It is:—"As the scheme now adopted will result in an increased yearly expenditure of 792*l*., this meeting pledges itself to do their best collectively and individually to obtain the necessary increase of funds which will be required to place the finances of the Institution in a condition to meet such increased expenditure." You have heard, in the Report which has been drawn up by the Special Committee, that there are, at the present moment, only 4,000 out of 32,000 who belong to the Services, on the retired and active lists, that are members of this Institution. That only represents 12½ per cent. The additional thousand members which we require will only make the proportion under 16 per cent.; or if the increased expenditure is as much as has been foreshadowed by Sir Redvers Buller and Colonel Young and others, the addition of 2,000 members will only bring the proportion to under 19 per cent., an addition of 6½ per cent. only to our present numbers. I feel sure that all those here present will go away from this meeting thoroughly determined to proclaim the benefits of the Institution to the Services. Everything depends upon individual efforts, and I am sure the appeal which the Council has made to you this day, and which you have so loyally responded to, will result in a large increase, a proper increase, to our numbers, and that we shall feel, in a very short time, that we shall be absolutely prepared to meet the increased expenditure with an income which will be fully adequate to our requirements. I must congratulate the meeting upon the unanimity which it has shown. It was perfectly right that the difference of opinion which was expressed by Sir Redvers Buller and Colonel Young regarding our future liabilities should have been brought to your notice, but, whether it is an increased expenditure of 1,000*l*. or of 2,000*l*., I feel sure the Services will rise to the occasion, and that we shall have no anxiety whatever in the matter of meeting it.

Admiral BOYS: Your Royal Highness, it gives me much pleasure to be called upon to second this resolution. I think everything has been said that can be said. I will only refer once more to the dilapidated condition of this building. The Chairman of the Council has promised you energy as far as the Council are concerned in the move that is now sanctioned. Immediate action is an absolute necessity, for if we stop here much longer the place will tumble down and we shall be driven into the street. As a proof of the value of the Institution to the Government, when I was in the Chair at a General Meeting two years ago, I received a note from the then Director of Naval Intelligence at the Admiralty, who stated that he had been wanting some special information, and it was not at the Admiralty. The only place he could and did find it was in the records of the Royal United Service Institution. I beg to second the resolution.

The resolution was then put from the Chair and carried unanimously.

Field-Marshal Sir LINTORN SIMMONS: Your Royal Highness, my lords, and gentlemen, there is one great feature with regard to this Institution which cannot be overlooked to-day. We owe a great deal of our success to the invaluable support which it receives from his Royal Highness the Commander-in-Chief (cheers). His Royal Highness has frequently presided over our General Meetings, and he takes the greatest possible interest in the Institution, knowing how much it does for the benefit of both Services. One great advantage of having his Royal Highness in the chair is this, that both Services equally look up to him (cheers). Therefore he is more likely than any other man in Her Majesty's Service to secure that unanimity

which ought to subsist at all times, and always has subsisted between the two sister Services (cheers), whether on active service abroad or on peace service at home. I venture to move, therefore, that the thanks of this meeting be given to His Royal Highness for presiding on this occasion, the proceedings of which will have more to do with the success of the Institution than those of any meeting which has been held since its first formation (cheers).

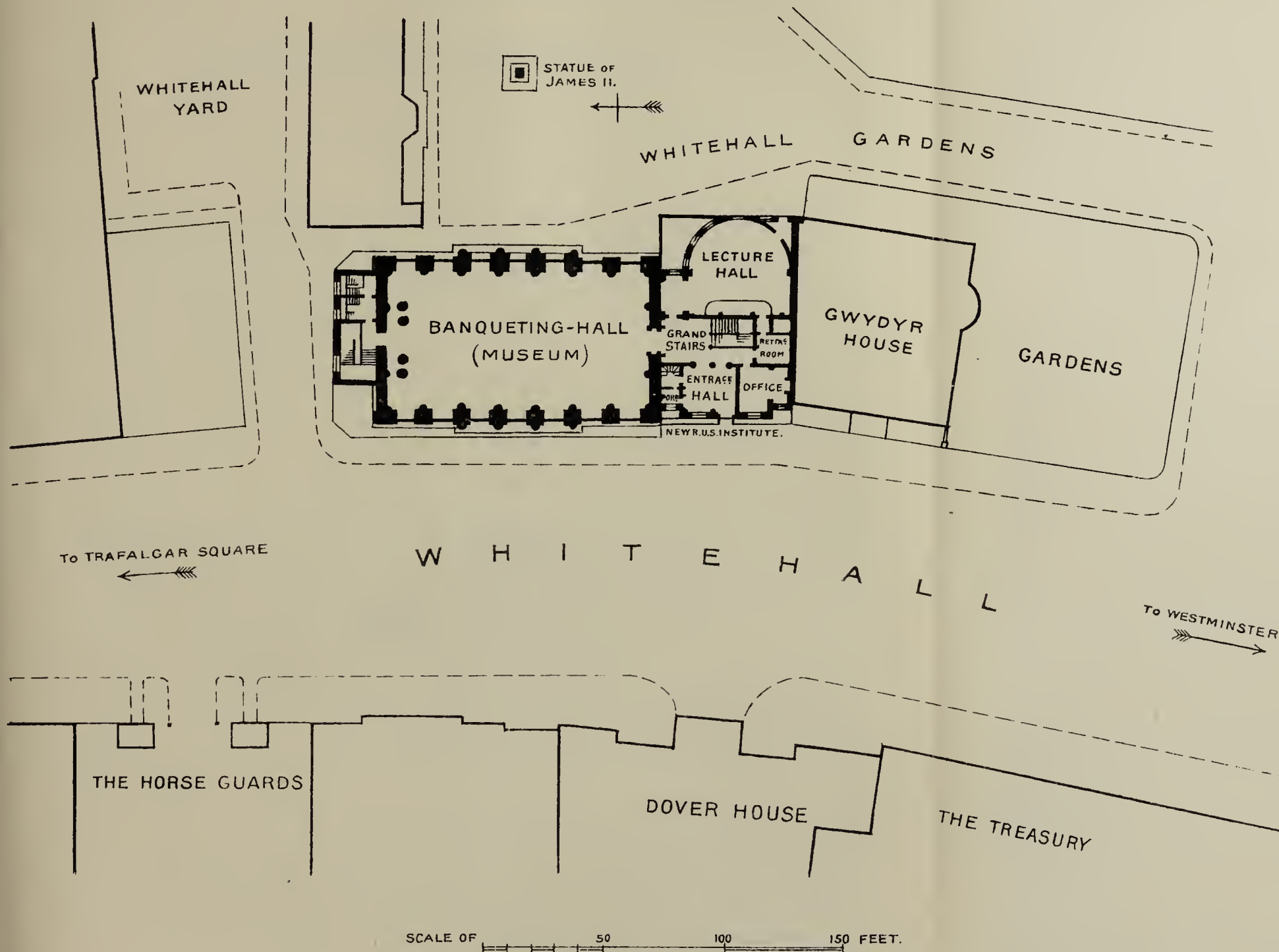
Admiral Sir HOUSTON STEWART, G.C.B.: I am very proud that the honour of seconding this motion has been committed to me. It must be at all times a great gratification to a Naval Officer to have the opportunity, even in the smallest degree, of testifying to what I believe His Royal Highness well knows, the great respect and esteem, and, Sirs, as truth cannot be presumptive, I may also say the affection which we entertain towards him. His Royal Highness has proved that no one is more alive to its importance, or has a deeper interest in the Royal Navy than he has, and he has taken every practicable opportunity of advocating and helping the improvement of our Service, for which we are very grateful.

The resolution was carried by acclamation.

H.R.H. THE DUKE OF CAMBRIDGE: Gentlemen, I feel more than flattered by the kind manner in which this resolution has been brought to your notice, and the very affectionate manner in which it has been seconded. I take this opportunity of again assuring this large assembly of the United Services that I have but one feeling, namely, the interest of Her Majesty and of this country, and I believe that that feeling can be best acted upon by doing everything in my power to assure both Services that I do not think that because I belong to the one, I ought not also to enter into the sentiments of the other (cheers). You have done, I think, if you will allow me to say so, a very right and proper action in coming to this unanimous resolution to-day, and I hope that it will not be supposed that my words of warning to a certain extent, were intended to be a damper. The result proves that they were not, and I can only agree with every speaker that has addressed you to-day that it would be, I may say, almost a disgrace to the Services if we do not maintain, and improve, and extend this great Institution in such a manner as to do credit to the two Services which, I believe, greatly benefit by its existence. I thank you most cordially for the kind reception you have given me, for the manner in which you have listened to me, and for the very handsome compliment you have paid me (cheers).

GROUND PLAN SHOWING POSITION OF THE NEW BUILDING OF THE ROYAL UNITED SERVICE INSTITUTION, AND SCHEDULE OF THE ACCOMMODATION.

(ASHTON WEBB & E. INGRESS BELL, ARCHITECTS.)



SCHEDULE.

ENTRANCE FLOOR.

ENTRANCE HALL, GRAND STAIRCASE	Members' Lavatory, Hats and Coats, Office for Clerks, Porter, Service Stairs and Lifts to all Floors.
LECTURE HALL	48' 0" by 40' 0" (average).
LOWER MUSEUM	106' 0" by 52' 0" (under Banqueting Hall).

PRINCIPAL FLOOR.

GALLERY OF LECTURE HALL.	
COUNCIL ROOM	29' 0" by 20' 0".
SECRETARY	13' 0" by 11' 6".
MUSEUM	110' 0" by 55' 0" (Banqueting Hall).

FIRST FLOOR.

WRITING ROOM	42' 0" by 20' 0", with Lavatory, &c., attached
REFERENCE LIBRARY AND READING ROOM	42' 0" by 32' 0" (average).
ASSISTANT SECRETARY	16' 0" by 11' 0", adjoining Library.

SECOND FLOOR.

WRITING AND TOPOGRAPHICAL ROOM	42' 0" by 20' 0", with Retiring Room.
GALLERY ROUND REFERENCE LIBRARY.	
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FOREIGN SECTION.

THIS portion of the Number, hitherto the Occasional Notes, has now become the Foreign Section, and is reserved for articles, either original or compiled, on professional subjects connected with Foreign Naval and Military matters; also for notices of Professional Books, either Foreign or English.

The Council of the Institution wish that this section shall be developed still further, and I have undertaken to continue my Editorship during the current year, with a view of aiding them in carrying out this work. It seems to me possible to make this section, and consequently the Journal, the means of keeping our Members acquainted with all naval and military progress abroad *pari passu* with that progress; and I shall be glad to receive from members of both Services, including in the latter those of the Auxiliary Forces, suggestions, information, or offers of assistance.

It is desirable, further, that I should state that, as regards editing the Naval matter in the Section, I shall have the aid of Naval Officers, thoroughly competent to give good advice and to pronounce sound opinions.

It must, however, be borne in mind that, as the change from a quarterly to a monthly issue has been made in order to ensure the more prompt publication of the Lectures after their delivery than has hitherto been the case, the Foreign Section will, as a rule, be restricted in extent during the Lecture season in the first half of the year, and will be prominent in the second half.

It is requested that communications and books for review (the latter under cover to the Librarian) may be addressed to me at the Royal United Service Institution, Whitehall Yard, London, S.W.

LONSDALE HALE,

Colonel R.E. ret.

TORPEDO-NET DEFENCES.

(Translated from the "Rivista Marittima" for June, 1892, by
THOS. J. HODDY, Chief Engineer, R.N.)

IN order to protect war vessels from attack by torpedoes, special nets of steel wire were manufactured, which, maintained at a convenient distance from the hull by means of booms of wood or iron, manipulated and largely reinforced by steel hawsers, pulleys, and purchases, completely surrounded the hull to a certain depth, and which were supposed to be capable of being kept in position both with the ships at anchor and while under way, to be got in and out with great facility, and to constitute a defensive element of great value without being a dangerous impediment.

With these nets experiments of various kinds were made, which were far from being economical; they encumbered all ships more or less, according to the type and the height of freeboard of each, and were scarcely introduced when ships of the slightest military importance barely escaped being lumbered up with them, such as transports and small vessels, where the encumbrance became most serious, and manœuvring an impossibility.

It was said that, as formerly the crews were trained in drill aloft, so now they should be trained to drill with the nets, so as to render the manœuvre easy, and be able to carry it out with great expedition under all circumstances of navigation or military service. In the technical publications various notes and criticisms appeared on the employment of these nets, but these notes nearly always appeared in an incidental manner as representing a simple personal opinion or observation, and, as far as I know, were never written comprehensively and explicitly against the invention in particular. Very inconclusive, in our opinion, were the experiments made with these nets; because carried out in peace-time, and under circumstances very different from the reality in war and in navigation in the open sea. Torpedo-net defences are now fitted to almost all ships of a definite military importance and of considerable dimensions; the employment of these nets thus becoming general, a method of providing the torpedoes with a special nipper, designed to cut through them, has been found, and the good results obtained with these nippers has succeeded in diminishing almost completely the defensive value of the nets, because it is an acknowledged fact that the ordinary nets can be cut cleanly through by the new nippers, and the torpedo pass freely through the hole thus made. In consequence of this it is thought advisable to increase the resistance of the nets, and it appears some navies provide, or will provide, their ships with nets weighing 50 per cent. more than those employed up to the present,

and presenting an efficient resistance against torpedoes furnished with the net cutters. It is to be supposed, considering the continued rivalry between the offence and defence on the sea, that nippers will certainly be found good enough to cut also the new nets, especially with the introduction into the service of torpedoes of large dimensions and heavy explosive charges; and probably the net makers will strive to invent another type of net of superior resistance, and so, *di sequito*, till practical experience shall bring in some efficient teaching for which some one will dearly have to pay.

In the many experiments made with nets, many specialities were brought out, either in the various modes of twisting and disposing the steel wire, or with tubular booms joined up in various manners; many were the modifications for each type of ship in the relative positions of the booms, in the points of attachment to the hull, in the manipulation of them, and in the rigging necessary for their management. However, as a result of these experiments, it was demonstrated more or less convincingly, according to the various theoretical opinions of the nets, and of the value of these experiments, that there was a great difficulty in defending the extremities of the ship, because of the difficulty of arranging and manœuvring the nets at these points, and this also in the most favourable case, that is, with the ship at anchor; it was, therefore, evidently impossible to obtain a practical defence from nets spread at sea with the ship in motion, even at the most moderate speed; it was proved that with the ship under way the nets came more or less to the surface, that they were carried towards the stern, and that the system experienced violent shocks, which were not all reassuring, especially in close quarters or in a slight sea; leaving out of account that the speed of the ships and the ability to make efficient use of their armaments were greatly diminished by the serious impediment and encumbrance; on some ships it happened that, under the conditions of navigation in the open sea, the booms were stripped and carried away, and brought up and down alongside the ship—and it is to be noticed that the experiments were generally carried out with new material, and not with material chafed and worn by the action of the sea water, or by frequent use at drill. Whoever has assisted at one of these experiments will surely remember the infinite inconveniences of installation, manipulation, and weight, which were remedied, as far as possible, with impossible stays, hawsers, purchases, winches, and gear, which ended in straining the decks, starting fastenings, and playing havoc generally; he will remember the never-ending carrying away of booms, bolts, and brails, and the constant expectation that, by the rupture of a head-stay, the whole system would inevitably disappear astern, just dropping nearly over and enveloping the projecting twin screws.

And all these inconveniences take place in peaceful experiments, being inherent to the system, and no account is taken in them of those inconveniences, much more serious, which it is logical to suppose would be caused in action against the enemy. One can easily imagine how much more grave would become all the inconveniences

enumerated when, in order to obtain greater resistance, heavier nets than those now commonly in use are employed. But leaving out of consideration at present the system and weight of the nets adopted, we notice that a ship of any class will be in a position to defend herself with nets in time of war, only on condition that she has not as yet taken part in any engagement with other ships. Especially after the introduction on board of numerous quick-firing guns of considerable power, it is not possible to admit that any ship can remain, even for a short time, exposed to the fire of an adversary without receiving damage to her net defences; nor is it logical to suppose that, in a defended place, opportunity could be found to place the nets in position, with all the necessary booms, hawsers, rigging, and gear; and even in the impossible case that a ship should be specially constructed, almost for this purpose alone, and she succeeded in doing it, it is certain that the supports of the booms, the points of attachment of the sheaves for inhauls, outhauls, brails, &c., and the necessary winches and fair-leads, would be damaged, just as every other part of the ship not efficiently enclosed and protected by armour would be considerably damaged; leaving out of the reckoning that even if means could be devised to protect the whole or a good part of the net system, keeping it under cover and protected by gun fire, it would truly be a disastrous operation to get it all up and in place after or during some phase of the combat, in order for the ship to protect herself from torpedo-boats, which exactly under these circumstances would be tempted to make an attack. Certain it is that the entire system of net defence which might be struck by projectiles would be the occasion of most dangerous splinters and fragments, more or less numerous; and it is certain there is no need to augment the probability of these sort of dangers on board modern ships, encumbered too much already with weak bulwarks, bulkheads, rigging, and fittings of every description.

It is therefore reasonable to admit that a ship of any sort would be able to rely on her net defence, in the single case that she has not as yet encountered the enemy. This general consideration is in my opinion important enough to constitute of itself, if not an absolute condemnation of the nets, at least a very efficient argument against them. But leaving out this and the positive fact that the actual nets in use do not stop torpedoes provided with net-cutting nippers, let us pass to the consideration of various conditions of maritime war, and more especially those in which the employment of the nets may be considered most justifiable. Evidently such cases are those in which the attack by torpedo-boats is most to be feared, and in which action by them is likely to be most opportune and efficient; generally these cases will depend on the development and character of the war on the sea, and which development and character will be imposed by the physical, hydrographical, and political conditions of the belligerent nations, and by the objects to which each must rationally subordinate the constitution and employment of its own maritime forces. In actions on the open sea between isolated ships or between squadrons net defence is not to be thought of, not even when contemporary

or subsequent attacks by torpedo-ships are to be feared; nor is it worth while that we should lose time in discussing such an evident fact, which is demonstrated by the experiments made in time of peace. When in the particular conditions of the vicinity and preponderance of maritime strength it is proper that one of the belligerent nations should commence the attack by some sudden and devastating incursion into the waters and on the coasts of the enemy, the principal elements for the success of this operation will be its suddenness and rapidity of action, and therefore the speed of the ships employed; consequently, although it is logical to suppose that attacks by torpedo-boats are to be feared, a squadron that attempted such an operation would not be able to keep the net defences down in expectation of them, for the principal advantage of speed and liberty of action would be lost, and the squadron would find itself in a very bad position if it should fall in with the ships of the enemy, an event which may be considered just as probable as an attack by torpedo-boats. The same may be said of an expedition by a single ship into an enemy's water, either for observation or any other object; and, therefore, we conclude that in actual war no Commander of a naval force or of a single ship who knew there was a chance of meeting the ships of the enemy in the zone in which he operated would risk keeping his nets down for fear of torpedo attack even if it were true that the nets could be taken in and stowed away for action in the smallest possible time, or if it were certain (which it is not actually) that they would stop the torpedoes. To protect the squadron or ship he would employ light ships, as torpedo-catchers, or even torpedo-boats. We can admit that ships would obtain information and be forewarned almost exclusively by torpedo-boats, and on such service would make large use of the nets when they had succeeded in clearing the sea of the enemy, and the war should finally assume a decidedly coasting character; but, as we have already said, such a service would be possible to such ships only as have not yet been in action, and very few would be in this condition in the final period of the war.

Passing on to examine other conditions of maritime war, let us consider the blockade and bombardment. The blockade at the present day cannot be considered as a very probable operation, nor can it be considered in the absolute sense of former times; in modern warfare it would result principally in a special cruising service carried out in various ways according to the locality, the force employed, and the object to be obtained. The naval force which maintained the blockade would probably chose a base of operations in proximity to the point to be blockaded, where it would anchor, ready to move as soon as its scouts had advised it that the enemy's ships would attempt to force the blockade. Particularly at night, the blockading force should have the torpedo-nets down in readiness to protect itself from torpedo-attack; but it is natural to suppose that the night time would be just the time the enemy would choose to force the blockade, if it were in a condition and under a necessity to attempt it, and therefore the blockading force ought to be ready

to act against and follow the enemy in the shortest possible time; if caught with nets down much valuable time would surely be lost in getting them in and stowed, so as to be no impediment in the pursuit, perhaps in a heavy sea, or in the action that might follow. Again, it is necessary that the blockading ships should be secured against a sudden attack by the ships of the enemy other than those blockaded, for if by accident it should be caught at anchor or under easy speed, with the nets down, even by a few cruisers which, especially at night, should open a brisk fire on it, the condition would not be a very joyous one; very possibly more than one ship might find herself in a bad case, and run a risk of having her screws rendered useless in the confusion of a sudden attack and the inevitable tumult which would take place in getting the nets in in a hurry and under fire; it is almost certain all the ships would cut away everything in the bustle, and cast the whole system adrift, thinking themselves lucky if it succeeded without some grave damage which would paralyze them fatally; and if the attack by the cruisers as we have described should be followed immediately, and during the confusion, by a torpedo-boat attack, the condition of the blockading force would be much worse than it would have been if it had been caught without the nets down. Besides, even if the blockading force were attacked by torpedo-boats only, and admitting that a special quality of net might be able to stop the torpedoes, we assert that the extremities of the ships cannot be efficiently protected; and, therefore, in the confusion which, in our opinion, renders an attack by torpedo-boats more certain against a number of ships than against a single ship it would not be difficult for the boats to hit some one of the ships in the undefended part, provided that they made a swift and resolute dash on her; and this can be said more or less both in the case when the blockading force is at anchor or under easy speed. It would be less easy for the torpedo-boats to operate successfully against a ship cruising alone or posted at a given point, but if they are numerous and manœuvred with ability and spirit, especially if their attack is preceded and supported by a rapid fusillade, even by the light guns of small torpedo-cruisers, we are certain that the torpedo-boats would succeed in blowing up the ship, in spite of the strongest torpedo-nets that can be invented. We repeat, however, that the torpedo-boats will have a much better game when they attack many ships together, especially if at the same time they use their electric lights and light guns. It is certain that it will not be a very happy time for those ships that have to hold a position at night on shores infested by torpedo-boats; the best defence will consist in keeping at a distance from such places as soon as they can, and, if this is impossible, to trust in a vigorous service of observation and watchfulness, making use of cruisers, torpedo-catchers, torpedo-boats, and launches, and also protecting themselves with improvised obstructions when the base at which the ships must remain will admit of it. Both in the case of a squadron and of a single ship surprised by torpedo-boats while cruising, the best course would seem to be to get under way at full speed, for we are of opinion that the speed of the

ship will be a defence preferable to that of the best possible system of nets.

As regards the case of bombardments, we would observe that this might possibly take place at the commencement of a war, as a sudden method of offence on the part of a preponderating force, and in such a case would be generally directed against unprotected towns or points weakly fortified, and with great difficulty against a position properly constituted and defended. The squadron carrying out the operation would have to do it quickly, and hold itself in readiness to meet an attack from the enemy's ships; we do not believe that it would do to keep the net defences down, because it appears natural to us that, unless under special circumstances, the bombardment would take place by day, the squadron taking the offing at night, which is certainly favourable to insidious attacks by torpedo-boats; the security of the bombarding squadron against these attacks from the point bombarded or its vicinity, should be obtained, in our opinion, by an attentive service of observation with light ships and other torpedo-boats, which should hold themselves in readiness to repulse the attacks of the enemy; and in the worst hypothesis, when the squadron has not sufficient means to repel these attacks, the ships should put to sea as soon as the attacking boats are discovered, and deal with them when in chase. The bombardment might also take place during the war, not as a sudden and preliminary operation, but as a means of hastening the surrender of a sea-port, or to weaken some given defended points of the enemy's littoral, but less probably under these conditions. In the special case of bombardment of a properly-constituted maritime position we would note that it is not possible to admit that the ships carrying it out would then be in a condition to adopt the net defence; the said operation would take place during the last phases of the war, and the ships would then certainly have been in action more or less, and would not have their net defence in a serviceable condition. But admitting that the ships could have their nets in order, we would observe that the bombardments would be carried out with the ships under way, when they cannot possibly keep the nets in the water, because, beyond the observations already made on this point, as the fort would suddenly open fire on the ships, if they kept their nets down they would be obliged to move very slowly, and any damage done to the net system might necessitate stopping to put it right, or might result in jamming up the propellers just when the ship is exposed to the dropping fire of the fort.

We will not continue further to specify other hypotheses or eventualities, because the above suffice for every case, whether in regard to the condition a bombarding squadron might find itself in when surprised by the enemy's ships with its nets down, or in regard to the means which we consider most advisable to protect the ships against an attack by torpedo-boats from the place bombarded or its vicinity.

Finally, we pass on to consider a special case which may be brought forward to show the necessity of providing ships with

torpedo-nets. Such a case would be when a ship is obliged, by damage to her machinery, which prevents her reaching a defended harbour, to anchor in an undefended, or insufficiently defended, roadstead, or on the nearest coast, in order to make good her defects as best she can; very probably she would have to fear attacks by torpedo-boats, and therefore would find her nets very useful. But in what circumstances, we would ask, could a ship of any importance find herself in the condition described and isolated in this manner? Not certainly under ordinary conditions of navigation, or very improbably, for almost all modern ships have duplicate machinery, and we cannot admit that such damage could be done, but that she could with one engine alone, at least, reach a safe port for repairs. Such extensive injuries could only occur as the result of an engagement, and then if the ship formed part of the defeated naval force, she would be certainly either captured or sent to the bottom before she could anchor in any port whatever; if she belonged to the victorious force she would certainly not be abandoned and left to her own resources in a dangerous spot, except in such strange and impossible circumstances as cannot be reasonably imagined; she would be surrounded, protected, and also moored in a secure position; if the damage be the result of an action against another single ship, she will certainly be lost. However it may be, or whatever the hypothesis, a ship which finds herself in such a condition after an action will have her net defences in a more unserviceable condition than ever. This postulated, it would seem useless to lose time in demonstrating that the torpedo-nets could not save a ship anchored in an undefended position and unable to move; evidently the enemy will do his best to destroy such a ship, and will use all the means at his disposal, and either by attacks with ships or torpedo-boats, or both combined, he will succeed in his intent, without any doubt whatever, whether the ship has nets to protect herself or not, or whether such nets are really effective or not; nor will the batteries of a partially defended harbour be able to save her from complete destruction; the only means of safety will consist in the support and protection that her companions and their torpedo-boats can afford her. We will not delay longer in imagining and discussing the cases and eventualities of war which might be invoked to show the necessity of torpedo-nets, for whatever hypotheses may be stated to this end, it will not be possible to neglect the value of the general considerations above exposed, and whatever special case may be imagined, it will be easy to show that they will decide always and surely against the nets as dangerous and inconvenient. The importance and efficacy of quick-firing artillery, especially in actions between ships, has arrived at such a point that the gun must be considered as the first and most inevitable element of damage more or less serious, and as no other part of the ship is more exposed than the nets to the first effects of artillery, therefore we conclude that, rather than serve as a problematical defence, the torpedo defence system would only serve for the production of dangerous splinters and fragments. And then a positive and irrefragable argument in our favour consists in the fact,

already cited above, that the actual nets are not able to stop the torpedoes, and it is reasonable to think that nippers will be found which will cut through nets of greater resistance than now actually in use with equal certainty.

After what we have stated in order to show the slight use of the nets, and the impossibility, almost, of obtaining an efficient protection from them, it may be asked, In what manner would you provide for the defence of ships against torpedo-boats? To us it seems that speed is one of the principal elements which would contribute to the safety of a ship attacked by torpedo-boats, and perhaps the principal element; a ship which finds herself in this position, in our opinion, should take to her heels, if she can, and the faster she is the greater chance she will have of escaping the torpedo-boat, and more hope of defeating them and being herself unhurt. Every means should also be sought to strengthen the hull, taking advantage to this end of the large displacement which is rendered necessary, especially in battleships and large cruisers, in order to provide an efficient protection against the numerous quick-firing guns. It should be endeavoured to localize the damage caused by a torpedo as much as possible, although this is now rendered far more difficult by the introduction into the Service of torpedoes of large diameter and very heavy explosive charges; but, above everything else, it should be remembered that the large ships must always be protected by an efficient service of observation, and escorted by cruisers and torpedo-catchers, to which numerous and good torpedo-boats should be added when the ships are obliged to act in a dangerous locality. In our opinion, the torpedo-catchers and torpedo-boats are as yet the best means of protection against the insidious attacks of their companions.

It is certain that for many warlike operations of a specially coasting character, the importance of the torpedo-boat is very great, and it is our opinion that, except in very particular cases, they should be preferred to expensive mine defences, constituted of a most changeable, but always delicate, material, tedious and difficult to prepare, and the working of which is very problematical, and not free from peril. Even the small torpedo-boats, of a type now antiquated, and considered useless for an attack against ships in the open sea, might be usefully and very conveniently substituted for numerous mines. If nothing else, they constitute a species of movable mine, with all the advantages that mobility and the attack have over the fixed and passive defence; it would certainly not present more difficulty to hit the mark with their torpedoes than to explode a ground mine for the same purpose, in spite of stations of observation, illumination, and discovery, and all the complicated implements, rules, and prescriptions necessary for the supervision and working of a mine defence; and the inconveniences relative to mine defences become most serious at night, either by the difficulty in distinguishing the friendly ships from ships of the enemy, or because of the difficult problem of assuring precise and concordant action at the look-out and illuminating stations, and those of observation for the explosion of the submarine mines. It certainly is our opinion that, in spite of the most minute

and stringent regulations for reconnoitring, the ship which, when followed by the enemy, attempts to find shelter in a port the entrances to which are guarded by mines will run great risks, and very probably the Captain of such a ship would prefer to remain outside at any risk, except when constrained to try it by motives of absolutely imperative necessity. Besides, we may hold that no enemy's ship, unless in very particular circumstances, would attempt to force a passage defended by mines, especially at night; very probably the ships which operate against a fortified place will seek to do all the damage they possibly can by simply coming as close as they can to the protected points, and for this reason the small torpedo-boats would prove much more useful than the mines, because they can operate against the ships so doing.

The defence by torpedo-boats will always have a moral effect at least equal to that of the mines; and as to material effect, they will have all the advantages that the attack, mobile and sudden, has over the defence, immobile and passive.

We will only remark on the controllable torpedoes, such as the Brennan, Sims-Edison, and others, for coast defence that, without wasting time in discussion on such weapons, we think it will be worth while to occupy ourselves with them when their inventors are able to tell us how they will judge, in spite of lights and indicating flags, whether their engine of destruction is 10 or 100 metres off the target, and how, therefore, they will be able to direct them and time the explosion properly, from a distance of 1,000 metres or more, especially at night; and this without speaking of the many other serious inconveniences peculiar to these kinds of weapons. Up to the present they have only been useful to those of their inventors who have succeeded in getting them adopted by some one, and we do not believe that they will ever contribute to any more conclusive end for the purposes of maritime war. The history of controllable torpedoes, in our opinion, is somewhat similar to that of the dynamite gun, of ships with wonderful rams and variable immersion for action, and of that of numerous submarine boats, and many other inventions relating to maritime war, viz., grand descriptions, many promises, wonderful experiences, but more or less complete shipwreck in practical employment, either in war or navigation.

In conclusion, with regard to coast defence under its varying conditions, we again repeat that, in our opinion, the best means for carrying it out are the employment of numerous torpedo-boats, large and small, modern or obsolete, and in the limited use of simple obstructions or batteries of automatic torpedoes, in order to absolutely enclose particular positions under given circumstances. In this manner a defence will be obtained which can be most rapidly prepared, the employment of which will be much less problematical, will be, morally and materially, much more effective, and also certainly much more economical.

THE MILITARY SITUATION IN UPPER EGYPT.

By Major VON WISSMAN.

(Translated from the "Militär-Wochenblatt," by permission, by Commander H. GARBETT.)

THOUGH the military affairs of nations whose method of warfare differ from the European are of interest to Germans who follow the calling of soldiers, this has become still more the case since Germany entered the ranks of the Colonial Powers, and it behoves her to take lessons from the older of those Powers in matters relating to Colonial military systems.

As the duty fell upon me three years ago to establish the first German Colonial corps, it was of special interest to me to make myself acquainted with the English military Colonial systems, and I joyfully seized the opportunity afforded me by a journey up the Nile for my health to study the soldiers of the Egyptian Army who had been trained by English Officers. It was of special importance to me to see the Negro battalions, because the major portion of the German force in East Africa is drawn from men of the same Sudanese races as the Egyptian black battalions. In Egypt the Sudanese are considered as distinct from the Egyptians; they form the infantry and are looked upon as the flower of the Army and the most trustworthy in war.

The Egyptian fellah is in many respects superior to the negro; he is more muscular, more intelligent, and a better rifleman, but he is far inferior in soldierly *moral*, and this one defect outweighs all the other excellent points in him. I said in soldierly *moral*, as in regard to common human *moral* the above observation does not apply. The Egyptian is more temperate and less given to quarrelling, for which reason the black battalions are never garrisoned in the large towns, but are always stationed on the frontier before the enemy. The Egyptian is, I might say, a better peace soldier; the Sudanese has more soldierly instinct and is a born field soldier, he serves in the Army so long as he is fit for active service; the fellah, on the other hand, only for six years; and after he has completed his service, returns to drive his camels, or plough with his buffaloes the fruitful valley of the Nile.

The Egyptian Army has as its tactical unit only the battalion, the squadron, and the battery; it is at present from 10,000 to 12,000 men strong.

The Egyptian battalions have four companies of 150 men each, the Sudanese battalions six companies of 100 men, whilst the squadron numbers from 70 to 80 horses.

Nearly half the Army is distributed in Lower Egypt, in Cairo, Alexandria, Suez, and at Suakin on the Red Sea; the remainder is distributed along the Nile on the high road from Egypt to the Sudan.

Suakin is the port of exit of the best and shortest road for an army to the capital of the Sudan, and will in all probability become the base of operations in the event of future operations against the Mahdi. I turn now to the Nile Army, which, since the last attempt of the Dervishes at Toski, in 1888, to force their way into Lower Egypt was frustrated, forms Egypt's wall of defence against the Mahdi's forces.

The state of readiness of this Army, whose reserves are stationed in Lower Egypt, is in the first place conditional upon the state of the Nile, the only route for an army. Wide stretches of country on each side of the Nile are impracticable on account of the want of water.

The Nile is navigable from its mouth to the First Cataract, at Assouan; and from there again to the Second, between Wadi-Halfa and Sarras. At the Third Cataract the outposts of the Mahdi are to be found, and, although it is now two years since any exchange of shots took place, he is still considered by the Egyptians as a hostile rebel, while he on his side, in his own interest as a ruler, cannot conclude peace. Between the Nile and the Red Sea dwell Nubian tribes, principally the Bischarin, who acknowledge the Egyptian Government, and are responsible for the security of the left flank of the Egyptian position on the Nile.

The left bank of the Nile is for a considerable distance unpopulated, for the Bedouin tribes belonging to the religious sect of the Senoussi, who live on the western borders of Lower Egypt, do not extend as far south as Assouan, where the civil administration of the Government comes to an end and the military begins, which latter embraces that portion of the Nile valley occupied by the Field Army, and is under the charge of the Sirdar, the English Commander-in-Chief of the Army. It is worthy of remark, the length of time English Colonial experience leaves a country in which absolute security does not yet reign under a military administration, and in a measure in a state of siege.

As we enter the military province at Assouan, below the First Cataract, we first meet with the reserves of the frontier forces, who are advanced as far as the Second Cataract. Everything can be brought as far as Assouan from Lower Egypt by means of steamers. A short railway on the right bank is laid round the cataract and conveys the traffic to the portion of the river which leads to the frontier. Assouan, garrisoned by two battalions, and the railway and landing place opposite the island of Philæ, above the cataract, are protected by a number of small forts which crown the edge of the Nile valley. Two river gunboats armed with one heavy and two machine-guns secure the traffic between the two cataracts, which is carried on by means of ten steamers. Half way between Assouan and Wadi-Halfa, on the right bank, lies Korosko, which is fortified and garrisoned by one battalion; it is the resting place for the night for boats making

the two days trip from Assouan to Wadi-Halfa, and is also the starting point of the great caravan route to Berber and Khartoum, which cuts off the great bend of the Nile to the west, the river for some distance on being a succession of cataracts. Wadi-Halfa, below the Second Cataract, is the headquarters of the frontier field force, and is garrisoned by two battalions, two squadrons of cavalry, a mule battery, and a camel corps. The place is fortified and secured by small forts distributed along both banks of the river. A railway on the right bank, protected by small forts, runs round the cataract, which extends for a distance of nearly twenty miles, to the advanced post of Sarras above the falls, where there is a garrison of a battalion, a squadron of cavalry, and a camel corps, the latter performing the scouting service towards the Soudan. I may here observe that the fortifications, although they may be sufficient against such an enemy as the wild Dervishes, would without exception be quite untenable against an enemy provided with good artillery. The bricks made out of the tough Nile mud are ready to hand and the cheapest building matériel. In one respect the forts are disadvantageously situated; in order to effectually command the river they have to be placed as near as possible to the brink, and consequently on both banks they can be threatened from the edges of the plateau commanding the Nile valley. The choice of positions is limited, as the landing places above and below the cataract, as well as the connecting railway, have to be secured, while for a considerable distance the Nile valley is very narrow, and, as already remarked, commanded by the brow of the desert; there are only a limited number of small detached forts on the heights, as any extensive fortification of the commanding points would require a considerable body of troops to man them. The design of the forts also is open to further criticism. There is no application of any known system; unenfiladed ways and dead angles are numerous, and there is often a want of flanking works; the height of the walls and depth of the ditches, which are dry when the Nile is low, are depended upon alone as the protection against their being taken by storm. The small forts are mostly square houses, which are entered by means of ladders, and are defended by the crenelated parapets of the flat roofs. My opinion as to the condition of the troops I will leave the reader to form his own judgment upon, while I put before him my observations in turn; only I must put forward two common points of view, which place in the right light the great military Colonial experience and the practical common sense of the English Officers. In an army, the matériel of which is composed of different races, the most important question is, whether the troops are completely trustworthy and under the proper control of their Officers. This is especially a burning question in Egypt, since it is not long ago that the mutiny under Arabi Pacha gave us an example of the rudest kind of the contrary.

Although the English Officers have to pay special regard to the views of the Khedive and his Government, and that for this reason a number of Egyptian Officers are placed even in the position of Battalion Commanders, nevertheless they have been extremely successful in

winning the complete confidence of their men. Another point worthy of remark is that the men have been educated into self-respect, into a recognition of the honourable calling of a soldier, and into a certain pride in their position. Anybody who knows what the Egyptian conscripts used to be, and how their detestation of serving in the Army was shown by their numerous self-mutilations and desertions, who has seen the fellaheen wallowing in dirt in their villages, which have all the appearance of dunghills, who is acquainted with their servile cringing habits, must stand astonished at the present self-respecting bearing of the cleanly and carefully dressed soldiers.

In the camp at Sarras I saw every tent environed by a flower garden neatly enclosed with white stones, and everything in and about the men gave proof not only of cleanliness, but of a certain sense of comfort. This is a result which could only have been arrived at after great trouble, and is entirely due to the efforts of the English Officers. It is sad to hear from the same Officers that this improved state of the men only lasts until they return to their dirty villages, but it is a sign that with proper education something can be made out of the poor, servile, and dirty fellaheen.

The Commandant at Wadi-Halfa, Lieutenant-Colonel Kempster, received me in the most friendly manner, and begged me to let him know what I wished to see; consequently on the first day I inspected the barracks of two Sudanese battalions. All the troops are quartered inside the fort in airy barracks constructed out of Nile bricks. As the Sudanese are for the most part married, one-fourth of them are allowed to leave in turn to spend twenty-four hours with their wives in the adjacent village, returning, however, for duty during the day.

On entering the barracks the men were called to "attention," and stood up in front of the bed-places which ran along the walls; they were in working dress, but were, however, military in their bearing and neat in their outward appearance. The bed-places, constructed of clay, were covered with a straw mat and a couple of woollen rugs. The arms stood in racks in the middle of the corridor, while the clothes and accoutrements hung on the walls over the bed-places. In the afternoon, upon the "alarm-place of assembly" of the centre fortification, a great game of football took place. About 100 Sudanese and some English Officers were playing. It speaks well for the military instinct of the Sudanese that an unbending of the Officers in this way in a spirit of comradeship does not cause any breach of discipline, but rather tends to raise the soldierly pride of the men; in the case of the Egyptian soldiers, with whom a more Oriental submissiveness predominates, and where there is an absence of the devotion engendered by comradeship which distinguishes the Negro, familiarity of this kind has to be avoided. On the second day of our stay we made a visit to Sarras, the most advanced post of all. The railway carries one past the Second Cataract, which presents a strange wild picture, and ends under a wall of rock rising precipitously out of the desert sand, and which is crowned by the citadel of Sarras. Sarras is armed with two heavy and two machine-guns, and lies close on the

Nile. What a magnificent climate it is, which allows of troops camping out all the year round in tents without suffering from the weather!

The Commandant of Sarras, the picture of a lank Anglo-Saxon warrior, Major Sillem, had the alarm sounded in order to show me the manning of the different posts. The troops were rapidly in position. It was a pretty warlike picture to observe from the summit of the crag, the men doubling to their stations between the small flower gardens and the tents, but the hurly-burly was soon over and the bugle-calls rapidly obeyed. The camel corps was sent forward as if to ascertain the cause of the "alarm." This corps is mounted on dromedaries, which are only ridden for scouting purposes, the men when necessary fighting on foot; it may be said to form a connecting link between cavalry and mounted infantry, such as the English have employed with much success in India and elsewhere. For a long day's patrolling in the desert the horse is far inferior to the camel, and good men armed as infantry on rapid dromedaries have been found best for the purpose. When fighting, the men dismount; three men fight, while the fourth leads the four camels, keeping them under cover in the neighbourhood of the fighting line. The great difficulty in training the dromedaries lies in getting the animals to lie down rapidly for dismounting, and still more in allowing themselves to be quietly mounted. Very few camels will remain quiet while this is being done. Attacks with camels should not be made on account of their obstinacy and want of speed for short distances. It is remarkable that the camel corps have no weapons for use against pursuing cavalry, which are faster over short stretches; I think myself that the revolver would be the most suitable weapon.

Upon our return to Wadi-Halfa the wildness of the naked black rock wilderness of the Second Cataract filled us with astonishment.

The result of an inspection of two battalions the next day was the conviction that the clothing and equipment of the troops is sufficient and answers all purposes, and that a careful and well-regulated supervision is everywhere exercised.

On the last day of my stay my worthy host the Commandant of Wadi-Halfa ordered a field day of the whole garrison. The troops first fell in in parade order in line, the cavalry on the right flank, then a mule battery, and next four battalions, two Egyptian and two Negro. The cavalry consisted of two squadrons, the front rank being armed with lances, the staves of bamboo, and the second rank with carbines; the horses, although looking lean from the want of green food, which is difficult to procure, and without being very rapid in manœuvring, seemed, however, to possess good staying powers. Rittmeister von Schuckmann, who accompanied me, spoke highly of the efficiency of the men. The mules of the artillery, content with poorer food, were fat and smooth, strong animals with powerful depth of chest. I should doubt, however, if their stubborn natures might not render them unsuitable for the work in the event of the guns being suddenly required, but for transport purposes in the desert they are excellent.

The infantry stand well, even according to our standard. Some movements and changes of front followed, and regimental exercise of the four battalions, in which the favourite *échelon* formations of the English played a principal part. For the march in the desert in face of a mounted wild enemy swarming down on all sides, the important battalion square is formed by wheeling the two centre companies to form the sides.

Battalion squares in *échelon* was the unaccountable formation in which Hicks Pasha's army of 7,000 men was drawn up when the Dervishes forced their way between the squares, and the men in which, firing on all sides, mutually shot each other down until the last man was destroyed.

When there is not a sufficient number of cavalry, there is only one effective formation against a fanatical enemy swarming on all sides, and that is a large square formed of all the troops on the march with the train in the centre. As there are no roads in the desert, the troops can march with as wide a front as is pleased, and the formation can be rapidly taken up. Formation in open order can only under exceptional circumstances be employed against the Dervishes. I found my East African experience with regard to the advantage of reserving the ammunition for volley firing confirmed. As the infantry battalions are commanded by English Officers, and the companies by Egyptian, the Battalion Commander only when absolutely necessary separates his companies, and therefore such a battalion corresponds in its tactical handling in a certain measure with a company with us.

On the day we left I made a small expedition up the left bank of the river to a precipitous conical rock rising about 100 feet out of the water, at the foot of which the wild cataract forced itself foaming through hundreds of islets and black masses of rock. We were mounted upon dromedaries of the camel corps, and covered the distance of 10 English miles in an hour and twenty minutes at an easy trot. When it is considered that a dromedary can trot for eight hours a day, carrying its rider, his arms, ammunition, and four days' water, food, and fodder, and can keep its speed up for four or five days, it will be seen of what value the animal is for scouting and similar services. Unfortunately they cannot live in a damp climate, so they cannot be utilized in our possessions in East Africa.

Durrha (a species of millet) and coarse fodder of chopped straw, &c., are the food of the camels in garrison, while on the march the hard prickly bushes of the desert form their nourishment.

On my return to Assouan I had the pleasure of making the acquaintance of Wodehouse Pasha, the acting Sirdar, and thanking him for the hearty welcome I had received at the hands of his Officers. I have written these pages to my comrades at home to give them some idea of the work of the English Officers in the Egyptian Service, and in the hope that they may prove of some interest to many.

CAVALRY SWIMMING.

(Translated from the "Invalide Russe," No. 87, 1892, by Captain E. LAMBART, R.H.A.)

AN order by General Skobeleff to the 4th Army Corps, of the 15th June, 1882, contains the following:—

"I do not admit the possibility of men swimming on their horses in full marching order, except over very small streams with firm bottoms, and I consider that swimming, commencing with small rivers, such as the Sooprasl (105' broad), and going on to regular rivers, such as the Danube, Wisla, Amoor, and Sir Daria, is best carried out by one of the following three methods, tried experimentally by three squadrons of the 4th Dragoons, on the 12th June."

The following is a summary of these three methods:—

(1.) *Narrow Rivers*.—The uniform and equipment of men and horses is carried over on rafts or small boats, and the men swim their horses over on watering bridles only.

(2.) *Broad and Swift Rivers*.—The men cross on boats or rafts with equipments as before; the horses, bitted up, swim over in squads, following a few guides, selected from the best swimmers, on their horses.

(3.) *In the Absence of Boats and Rafts*.—A few experienced swimmers, one of them tied round with a long, thin rope, swim to the opposite bank, and then with the rope pull across an axe and a picket rope, which is made fast to a stake or tree. The picket rope is then tightened and made fast at the starting point. A detachment of the best swimmers is then sent across without their horses, and taking with them in a bundle round their necks the necessary clothing and their rifles, ammunition, and entrenching tools. This detachment takes up position to cover the crossing, establishing visual signalling communication with the rest. The remainder of the men then cross, holding by the rope, with their kits, &c., slung round their necks. The use of several picket ropes of course materially quickens the operation. Last of all, the horses are sent over in squads, with the bits on the rear arches of the saddles.

In connection with these orders of the illustrious Skobeleff, it is worth while to bring to notice an invention designed to materially assist cavalry in crossing rivers.

The invention (of a Sub-Lieutenant in the Semenorski Life Guards) consists of a canvas bag, waterproofed, and fitted with a cork that seals it hermetically. Its weight is about $2\frac{1}{2}$ lbs.; length, $4\frac{1}{2}$ feet; and width, $2\frac{2}{3}$ feet.

This bag, filled with the uniform and accoutrements of the man, and the whole of his saddlery, &c., and corked tightly, not only does

not sink, but can even support some additional weight. One end of the bag is fitted with a rope having a large loop.

On the 8th July, 1890 (says the writer), at the request of the inventor, I tried these bags on the River Sooprasl, near Baylostok, with excellent results. Accompanied by my orderly, I went to the river, and having packed our uniform, arms, &c., in the bags, and slung them round our necks, we jumped our horses into the water, holding on by their manes, and crossed the river backwards and forwards several times. The bags towed behind us, and did not hamper our horses in the water in the least. After this we tied the ropes to bushes on the bank, and let the bags remain in the water for more than half an hour, without any of the contents getting damp.

A pack animal, carrying 80 to 100 bags, might easily accompany each squadron in Dragoon and Cossack regiments on service.

In case of detachments of less strength than a squadron, the bags might be slung to the rear arch of the saddles. It would not do, however, to carry the bags on the saddles permanently, as they add to the already heavy equipment, and, besides, the rubbing would quickly wear out the bags; for this reason I suggest pack animals.

This invention certainly deserves attention, especially when we consider that, though swimming rivers is now part of the programme of our summer drills, many Officers and men fail to become good swimmers, owing to their being quartered at a distance from water. Moreover, even at manœuvres, there have been cases of drowning when the swimming practice is being carried out. In peace-time, as a rule, drowning men can be rescued, but in war there is no time for this, and though our cavalry are trained to make light of all risks on service, in the moment of the charge every sabre counts.

One of our most distinguished cavalry leaders says of this invention:—

“In the days of armed peace in which we now live, so valuable an invention must be made known as quickly as possible. I am personally convinced that this invention is of great importance in independent cavalry operations, in raids in the theatre of war, and particularly in ‘partizan’ warfare. If we make use of it, neither the Wisla, nor the Narva, nor the Bug will stop us.”

COMPARISON OF THE MOST IMPORTANT REGULATIONS OF FOUR CONTINENTAL POWERS AS REGARDS THE ATTACK AND DEFENCE.

(From "Militär-Wochenblatt," June 29, 1892.)

ATTACK.

Germany.

THE German Regulations make a distinction between the "Begegnungsgefecht" (improvised fight) and that on a prepared position; in the latter case the attack being in conformity with a prearranged plan, and preceded by a deployment; in the former case the fight is developed from the march, the deployment of the main body being effected under the protection of the advanced guard.

The attack is divided into three parts—

1. Troops are thrown forward to open fire on the enemy as near to his position as the ground allows.

2. Strong swarms of shooters work their way up to these troops and endeavour to conquer the enemy by fire. The only prospect of success lies in obtaining this superiority of fire.

3. When this superiority is attained, the shooting line, aided by supporting troops arrived close at hand, advance to storm the position. This order will, as a rule, come from the highest Commander, but the impulse (*anstoss*) for the attack may also proceed from the shooting line.

The retreating enemy is pursued with fire after the capture of his position.

An enveloping attack is recommended as conducive to success; but this is not to proceed from the developed fighting line but must be arranged for beforehand.

Russia.

The attack is divided into—

1. Advance.

2. Attack.

From the deployment ("Entwicklung der Gefechtsordnung")—about 2,000 paces from the enemy—to the entry within the zone of strong hostile rifle fire—800 paces from the enemy—the advance is continued along the whole front in quick time. From this point the attack is the object of all forward movements. The command has ascertained the position of the enemy, arranged the plan of attack, strengthened the shooting line, and given to all the troops the right direction in which to attack.

The advance is by rushes either of the whole line or by portions of the same. The last firing position from which the attack is prepared by fire is from 300—150 paces from the enemy. From this point the attack is with the bayonet. Reserves advance over open ground in line with open files. When the shooting line is in its last position (300—150) the reserves may not be further than 200 paces in rear of it. The reinforcement of the shooting line is carried out before advancing to the attack, at 800 paces from the enemy.

Austria.

The Superior Commander draws up a plan of combat. The offensive must always be taken. If possible the attack must be enveloping, and only frontal when a surprise or approach under cover is possible, or if any other direction for the attack is not available.

Under the protection of a preparatory fight follows the development of the main body next to the advancing line; later on the main body is pushed forward to those points from which the attack proper will commence, and at the decisive advance moves direct forward.

The principle is to arrive quickly as near as possible to the enemy. At long rifle range, 2,000—1,000 paces, the advance is by the whole line. At medium ranges, 1,000—500 paces, simultaneous rushes by whole companies; from 500 paces is carried out the decisive attack, after previous shattering of the enemy by fire. There must be a constant pressing forward everywhere. The order for the attack will, as a rule, come from the Supreme Commander ("Signal-Storm"), but the impulse for it may be given from the shooting line. At the moment before the decisive attack is made ("Beim Abbruch des Gefechts vor der Entscheidung") the reserves are to be sent back to take up on the flank a rallying position, but only there where obstinate resistance is intended.

France.

The attack alone can obtain decisive results.

Formations for the advance are to be chosen suited to the ground and screened from the enemy's view. No premature deployment; only when the enemy's fire renders it necessary will a shooting line be extended, sufficing for the opening of the fight. If the hostile fire is opened, fire will be opened in reply at 700 metres, otherwise as near the enemy as possible. The further advance follows from position to position, the intermixture of commands being avoided; the supports come up on the flanks and in the intervals. The supports gradually near the shooting line. As soon as fire reinforcements are necessary, half-sections or sections are sent forward in the intervals or on the flanks. This insertion of reinforcements gives the impulse to a further advance.

When the advance has arrived at 400 metres, the action is carried

on with the aid of the reserves, the advance being by 50-metre rushes of companies or in *échelon*. Those shooters left in rear may not fire if there is not interval available. At 250—200 metres bayonets are fixed. The shooters increase the fire, and direct it on to the point to be assaulted. The advance of the reserve to the assault is the signal for the storming, if the enemy has not yet given way. To the "storm pace" soon succeeds the "double;" with the cry "*En avant à la baïonnette*" all throw themselves on the enemy. This is conducted with the greatest energy.

The pursuit is carried on by fire. In case of failure of the attack, company leaders rally their companies quickly and endeavour to renew the attack, for the advance is always preferable to the destructive retreat.

COMPARISON.

In all four the attack is in three parts. The Russian primary division is of two, but the attack portion subsequently becomes two, making three.

The first is the advance towards the position up to the opening of fire.

The second is the carrying through the fire fight and advance up to the storming.

The third is the bayonet attack.

The four systems agree that the first stage is to be carried out with weak advanced troops; the extended shooters going forward in one body quickly as near to the enemy as possible. The Germans do not give any distance to which this first advance should be made, nor where it commences. The Russians and Austrians give 2,000 paces as the commencement. The French make the formation of a shooting line dependent on the enemy's fire.

The Russians consider up to 800 paces, the Austrians 1,000 paces, the French 700 m. (900 paces) as the distance from the enemy to be attained by the first general advance.

For the fire fight the Germans give strong swarms of shooters working their way marching or by rushes, and seeking to gain superiority of fire. The Russians and Austrians order rushes, the former to 300—150 paces, the latter to 500 paces, the former with the whole or parts of the shooting line, the latter by whole companies.

The French by rushes, company or *échelon*, up to 50 metres from the enemy; no mixing up. The Russians reinforce the shooting line at 800 paces before the commencement of the attack. The French accept 400 metres as the distance for the entry of the supports. The Germans and Austrians are silent on the subject. All four demand the shattering of the enemy by fire before the commencement of the storming.

All four have the advance to the storm carried out by the shooting line aided by the reserves. The Germans bring their

reserves for the purpose close up, the Russians at most 200 paces from the shooters.

With the Russians the bayonet attack commences from the last firing position, 300—150 paces; the French 250—200 metres from the enemy; the Austrians say the attack proper commences at 500 paces; the Germans give no distance.

Both Germans and Austrians leave the order for the decisive assault to the highest leader, or through impulses from the shooting line. The Russians and French are silent on the matter. All four pursue the enemy with fire; the French provides for a renewal of a failed attack.

It is to be noted that the German Regulations order the deployment before the fight; whilst the Austrian Regulations order the development of the main body, and, later on, its movement to those points from which the attack proper is to commence.

THE DEFENCE.

German.

The Regulations lay down as the principle:—"It depends on the profitable use of the fire-arms; thus is determined, therefore, the selection of the position and skilful strengthening of the same." The shooting line will from the commencement be as strongly held as is necessary for the object of the fight. The position is to be strengthened, the distances indicated by marks, ammunition distributed and kept in readiness; the supports are to be drawn forward and all distances in depth diminished. The number and breadth of the sections varies according to the ground; each is a unit of command with its own reserve.

The main reserve is to be placed where it can pass to the offensive, which is necessary if a victory is sought for. As a rule, this place is on one of the wings, the more to the flank as the defending force is larger; by this means the danger of turning movements is at the same time guarded against. The position is occupied as soon as the direction of the attack is known.

Russian.

As principles are accepted, advantageous employment of fire-arms, then counter-attack with the bayonet.

In selecting a defensive position the field of fire, cover, and distances are to be taken into consideration; weak points to be occupied more strongly, artificial cover and communications provided, flank protection is to be attended to. The development of fire takes place gradually, the ammunition is to be reserved for short ranges. The fire will be specially directed on the attacking shooters when they rush forward; the attack is repulsed by volleys delivered by the reserve from the shooting line. If the enemy does not hold his ground, the shooting line and the reserve attack him with the bayonet,

and where possible by a part of the reserve on his flank. The reserves must, therefore, for this purpose be drawn forward in time. After repulse of the attack, the enemy is followed up with fire. During a retreat individual shooters fire, positions chosen in rear are to be occupied; the reserves retire with the shooters in quick time.

Austria.

The principles are—Utilization of the ground and profitable employment of the fire-arm. The offensive must always be combined with the defence if a decisive success is aimed at. Field for fire, depth, freedom for movement, must be taken into consideration in choosing a position. The strength employed must correspond to the object of the fight; a weak occupation at the commencement is faulty. Patrols are sent to the front to watch. The position is divided into sections, each with its own reserve. Some points are more important to occupy than others; a uniform distribution of troops is incorrect. Independent points for defence receive special garrisons.

A strong main reserve is posted behind one flank. Until the enemy's intention is apparent the troops are held in readiness; the protection being entrusted to patrols. Reconnoitring, measuring ranges, arranging cover are to be taken in hand. The reserve is drawn forward near to the front line. As soon as the direction of the attack is known, the position is strongly occupied. On columns and guns fire is opened at long ranges; on the most threatening enemy at medium ranges; at short ranges fire from all available troops.

If a counter-attack is intended the main reserve may not be employed for any other purpose; it must deploy quickly when the attacker has arrived at deciding distance, open on him a powerful flanking fire, and then attack with the bayonet. Counter-attacks from the shooting line are to be avoided.

If a counter-attack is not intended, the main reserve strengthens the shooting line or meets any flank attack. Pursuit is carried on by fire.

French.

The defence relies on fire and suitable employment of ground. Passive defence is absolutely rejected. Active defence turns to account the advantage of the choice of ground and the expectant attitude, only as an increase of strength in order to beat the enemy in a known position more certainly and under more favourable circumstances.

The Commander pays attention to the advantages for offence and defence, the line of defence, supporting points, flanks, communications to the front and in rear; points of assembly and line of retreat. According to these considerations follows the distribution of the

sections to the lower commands and the construction of defensive works.

The lower leaders at once make themselves acquainted with the ground in front of them and the contiguous positions, find supporting points, ascertain ranges and communicate them to those under their orders. The Commander of the support marks the lines of approach to the line of defence.

If the fight is not to commence at once the Commander sends forward only enough men to watch and to carry out the defensive works. The remainder are held in readiness to advance in a protected position. The formation is generally the same as that for attack. The front to be held by a company is about 200 m. (220 yds.), without uniform occupation being necessary.

The choice of position for the supports depends on the probable fall of the enemy's projectiles. If the ground allows, the depth of the formation is to be diminished. On the approach of the enemy the patrols report his strength, proceedings, and direction of his attack; their first resistance can compel him to deploy and reveal his intentions. On this the Commander comes to a decision. As soon as the attack is pronounced the position is occupied.

Fire is opened as soon as it becomes effective. The intensity of the fire depends on the range and the importance of the target; the best shots fire on the hostile leaders. When the enemy approaches, and his fire increases, the supports gradually strengthen the shooting line, in order to give the necessary amount of fire. The reinforcements should either prolong the line or enter it, never causing it to close. Detachments will be told off to fire on the supports and reserves, whilst the others reply to the fire of the enemy's shooting line. By the time the enemy is arrived at 400 m. (430 yds.) from the position, ordinarily the supports will have been absorbed in the shooting line, and the defence will be continued with the aid of the companies in reserve. The counter-attack is carried out by the companies in reserve. If the attack fails, the pursuit is continued by fire, and the defence prepare to assume strongly the offensive. If the attack succeeds, the companies are disengaged under the protection of the fire of closed detachments, and collect at some spot determined beforehand by the Battalion Commander.

COMPARISON.

All four Regulations bring forward prominently as the main principles the utilization of fire and the judicious use of ground. As regards the former, the Russians develop fire gradually, the French, on the contrary, order fire to open as soon as the enemy can be hit; the Germans act according to their own musketry regulations. The Austrians use fire mainly at medium and short ranges, and only at long ranges where the ammunition is sufficient and the target large. All the regulations, with the exception of the Germans, recommend the constant employment of volley firing. As regards the choice of the position and the measures for strengthening it, the regulations are

in accord, as also in respect to the division into sections, diminution of depths, section reserves in readiness in covered positions, a sufficiency of troops for the occupation of the position when the line of attack is known, and an independent main reserve, if possible behind a flank. On the last point, the Germans emphasize the advantage of a simultaneous flank advance, and expressly lay stress on the fact that it is wrong to hold back the main reserve to protect the retreat, instead of employing it in the fight. The French reject, *in toto*, the passive defence, and insist always on the offensive. The Germans and Austrians only if a decisive success is intended. The Russians on the order of the Commander, if the assailant is to be shattered.

From the foregoing it is evident that the four Regulations are practically in accord as regards the attack and defence. Success depends, therefore, on which troops are best led, trained, and disciplined.

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FOREIGN SECTION.

THIS portion of the Number, hitherto the Occasional Notes, has now become the Foreign Section, and is reserved for articles, either original or compiled, on professional subjects connected with Foreign Naval and Military matters; also for notices of Professional Books, either Foreign or English.

It is requested that articles, communications, and books for review (the latter under cover to the Librarian) may be addressed to me at the Royal United Service Institution, Whitehall Yard, London, S.W.

LONSDALE HALE,

Colonel R.E. ret.

COLONEL v. LÖBELL'S¹ ANNUAL REPORTS UPON THE
CHANGES AND PROGRESS IN MILITARY MATTERS
DURING 1891.

Compiled by Colonel H. HILDYARD.

THE reports relating to last year, published in Berlin in June, 1892, form the eighteenth issue of the series edited by Colonel v. Löbell each year since 1874. Their value is by this time so well known to all who are interested in military matters abroad, that it seems almost superfluous to call special attention to them again this year in addition to extracting from them, in a condensed form, the matter that seems to have the greatest interest for us. It may be, however, that some Officers who are interested in the subject, and who, by their knowledge of German, are able to go to the unabbreviated originals for their information, are unaware that there exists so complete a history of the formation and constitution of modern armies, and of the progress of military art in all its branches, as is contained in the eighteen volumes published since 1874 by Colonel v. Löbell. These are to be found in the library of the United Service Institution, and will form there, for all time, the most reliable record of the manifold changes in organization, armament, and tactics introduced during the two last decades. A summary—brief and necessarily incomplete—of the contents of each volume has been published, year by year, in the Journal of the Institution, in the hope that it might be found of some use by those unable to read the original. The number of these is happily becoming constantly less, and to Officers studying German Colonel v. Löbell's publications can be confidently recommended as a text-book for military literature.

The arrangement of the latest number issued does not differ from that adopted in previous years. The work is divided into three parts: the first of these deals exclusively with the organization, instruction, and progress of the numerous States that maintain a standing army; the second is devoted to the general consideration of the tactics of the several branches—infantry, cavalry, field artillery—and of fortress warfare, with treatises on military small arms, artillery matériel, and military literature; the third part is reserved for obituary notices on distinguished Officers of all nations. The summary that follows these introductory remarks deals only with the first two parts.

The reports for 1890, for reasons explained at the time, did not

¹ "Jahresberichte über die Veränderungen und Fortschritte im Militärwesen," 18 Jahrgang, 1891, herausgegeben von H. v. Löbell, Oberst z. Disp.—Berlin. Ernst Siegfried Mittler und Sohn. 1892. 1 vol. Pp. 500; size, 9·5" × 6·5" × 1"; weight 1 lb. 13½ oz. Price 9s. 6d.

include in the first part any notice either of the German or of the Swiss Armies. The omission has now been made good by the insertion this year of reports on these armies covering the whole period 1890-91. As a result of this arrangement the report on the German Army comprises 62 pages. That on the French Army comes next in point of length, with 36 pages; the Austrian Army has 31 pages; the British, 28; the Turkish, 27; and the Russian, 23. The reports on lesser States occupy the remainder of Part I, and it is noticeable that, with the exception of brief statements respecting the armed forces of Persia, Egypt, and the Congo State, the reports are restricted to the armies of European States. The reason for this is, no doubt, to be sought in the necessity for limiting the length of the work by the excision of such portions as are of least immediate interest. Exclusive of the third part, it comprises, as it is, 457 pages.

Germany.

Organization.—The year 1890 was a very important one for the development of the German Army. On the 27th January of that year a law was enacted introducing changes in the Imperial Military Law of the 2nd May, 1874, paragraphs 3 and 5 of which stood amended as follows:—

Paragraph 3.—“An Army Corps will be formed of two to three divisions with the corresponding artillery, pioneer, and train formations, so that the entire military force of the German Empire in peace will consist of twenty Army Corps. Two Army Corps will be formed by Bavaria, one each by Saxony and Wurtemberg, whilst Prussia in common with the other States will provide sixteen Army Corps.”

Paragraph 5.—“The territory of the German Empire will be divided for military purposes into nineteen Army Corps districts. As a basis for the organization of the Landwehr, as well as for recruiting arrangements, the Army Corps districts will be divided into division or brigade districts, and these again into Landwehr and control districts (company districts, districts of chief recruiting offices, or recruiting offices), according to their dimensions and population.”

The law came into force on the 1st April, 1890, by which time two new Army Corps had to be created by Prussia, the 16th Army Corps in Lorraine and the 17th Army Corps in West Prussia. The Staffs for both corps for the corps commands, divisions, infantry, cavalry, and field artillery brigades and field artillery regiments were formed. but the troops were taken from previously existing formations. For example, the fifteen 4th infantry battalions were converted into five new infantry regiments, and distributed to different Army Corps.

The new Army Corps were formed by drafting from other regiments to compose the the 33rd, 34th, 35th, and 36th Infantry Divisions; cavalry brigades and field artillery brigades and regiments were created in the same way.

The second important step towards the development of the Army was inaugurated by the Law of the 15th July, 1890, regulating the peace strength. It ran as follows:—

“Para. 1. The peace strength of the German Army with the colours is fixed at 486,983 men for the period between the 1st October, 1890, and the 31st March, 1894. The one-year volunteers are not included in the peace strength with the colours.”

“Para. 2. From the 1st October, 1890,

“The infantry will be formed in	538 battalions.
„ cavalry	„ 465 squadrons.
„ field artillery	„ 434 batteries.
„ foot artillery	„ 31 battalions.
„ pioneers	„ 20 battalions.
„ train	„ 21 battalions.”

By this measure an increase of 4 battalions, 74 batteries, 1 pioneer battalion, and 3 train battalions was made to the Army. The general result of the increase to the field artillery has been to give to each Army Corps 2 field artillery regiments of 7 brigade divisions, 6 of which are composed of 3 batteries of field and the remaining 1 of 2 batteries horse artillery. Some Army Corps have more : the Guard and 1st Bavarian Corps, for instance, have 2 brigade divisions of horse artillery, besides 6 of field. The 1st, 3rd, 5th, 17th have 7 brigade divisions of field artillery, besides 1 of horse; the 12th and 2nd Bavarian Corps have 9 brigade divisions of field, besides 1 of 3 batteries of horse, artillery.

A Railway Brigade, of two railway regiments, has been formed from the previously existing Railway Regiment. The 1st Regiment is composed of the former 1st and 2nd battalions; the 2nd Regiment of the 3rd and 4th battalions. The balloon section is attached to the 1st Regiment.

The train battalions (or companies) are placed entirely under the Army Corps command, and within this under the field artillery brigades. In connection with this change, the train inspection is done away with and a train dépôt inspection is created.

Two Inspectors of Cavalry have been appointed with the rank of Lieutenant-Generals. Their functions are to conduct the special cavalry exercises that are held yearly, and the tactical tours made, by the Emperor's orders, by cavalry Generals and Staff Officers. For these duties the Inspectors are placed directly under the Emperor, to whom they are to report. The Emperor reserves to himself the right, on the representation at any time of the Minister of War, to employ the Inspectors to inspect, with the Inspector of Remounts, the horses of any body of troops.

The Inspectors are made members of the Cavalry Committee created at the same time. The other members are the Commander of the Guards Cavalry Division, two Officers of the Ministry of War, an Officer of the General Staff, an Officer of the field artillery to be detailed by the Minister of War. The senior General acts as Chairman of the Committee. The temporary increase of the Committee by the Inspector of Remounts, an Officer of the Military School of Equitation, by regimental Officers, the Inspector of the Military

Veterinary Service, by members of the Stud Department, &c., is arranged as required by the Minister of War.

Command of the Train.—The following instructions were issued in connection with the changes effected in the command and inspection of the train. The functions of the previously existing Inspector of Train pass to the General Commanding the Army Corps, and under him to the Commanders of field artillery brigades, so far as the following points are concerned:—

1st. The conduct of the arrangements connected with the personnel, exclusive of the train dépôt Officers.

2nd. The inspection of horses, the clothing, arms, and equipment, exclusive of field stores and exercise matériel.

3rd. The conduct of the training and supervision of the duties.

The field artillery brigade Commanders preside at the committees of inspection for the train battalions.

The Train Dépôt Inspectors are charged with the following duties:—

1st. The conduct of matters connected with the personnel of the dépôt.

2nd. The inspection and completion of the field stores and exercise matériel.

3rd. The submission of proposals for the improvement of the matériel and the conduct of experiments.

4th. The superintendence of the dépôt administration.

The Train Dépôt Inspector has the rank of a regiment Commander. He is subordinate to the Director of the branch at headquarters.

Colonial Defence Force.—By a law of the 22nd March, 1891, a special defence force for German East Africa was created. The duties of the corps to be raised were specified as being the maintenance of public order and security in German East Africa, especially the suppression of the slave trade. The force was to be composed:—(1) of Officers, military engineers, medical Officers, officials, and non-commissioned officers of the Imperial Army and Navy who volunteered for it; (2) of enlisted natives. Those volunteering from the Army cease to belong to it on joining the defence force. The numbers of the force are:—

Germans.—30 Officers.

10 Surgeons.

1 intendant.

12 pay officials.

1 superintending armourer.

10 serjeants-major.

34 non-commissioned officers.

18 sick attendants.

2 armourers.

Natives.—12 Lieutenants.

50 non-commissioned officers.

1,500 privates (organized in 10 companies).

Recruiting.—The following table shows the number of recruits per unit taken for service with the colours in 1890 and 1891 respectively in the Prussian troops. The difference was approximately the same in the two Bavarian corps:—

	1890.	1891.
To each battalion of infantry on the higher establishment	230	244
„ „ „ „ medium „ . . . .	..	228
„ „ „ „ lower „	200	209
„ „ jagers „ higher „ . . . .	..	232
„ „ „ „ medium „	190	216
„ „ „ „ lower „ . . . .	..	199
„ cavalry regiment „ higher „	150	160
„ „ „ „ medium and lower estab. „	150	150
„ horse artillery battery „ higher establishment	35	35
„ „ „ „ medium „ . . . .	..	32
„ „ „ „ lower „	25	25
„ field battery „ higher „	35	38
„ „ „ „ medium „ . . . .	..	35
„ „ „ „ lower „	30	30
„ battn. of foot artillery „ higher „	200	210
„ „ „ „ lower „	160	168
To the Guards pioneer battalion	210	221
To other pioneer battalions	164	172
To each battalion of the Railway Regiment	135	135
To the Balloon section	15	15
To each company of the Baden Train Battalion No. 14 and of the Train Battalion No. 15, for 3 years' active service	15	18
Ditto for 6 months' active service in the autumn and spring . . .		38
To each company of the other train battalions, for 3 years' active service	38	15
Ditto for 6 months' active service in the autumn and spring . . .		38

Training of Men not with the Colours.

i. Belonging to the Reserve and Landwehr.

Distribution.	1890-91.		1891-92.	
	Prussians, &c.	Bavarians.	Prussians.	Bavarians.
Cavalry	6,900	720	5,280	720
Field artillery	7,524	900	7,536	902
Foot „	3,800	850	3,800	700
Pioneers	2,300	} 665 {	2,300	} 665 {
Railway troops	400		600	
Balloon section	20	..	20	
Train	5,517	896	5,320	882
Totals	26,461	4,031	24,856	3,869

The period of training was: for the cavalry 28 days, for the balloon section 21 days, for the train as specially ordered, and for the rest 12 days.

ii. *Belonging to the Ersatz Reserve. For a first (10 weeks') Exercise.*

Distribution.	1890-91.		1891-92.	
	Prussians, &c.	Bavarians.	Prussians, &c.	Bavarians.
Infantry	9,610	1,500	9,610	1,500
Jägers	300	50	300	50
Foot artillery	1,150	200	1,150	200
Pioneers	630	90	630	84
Train	810	120	810	120
Total	12,500	1,960	12,500	1,954

For a second (6 weeks') Exercise.

Infantry	8,730	1,310	With the exception of the train, all the Ersatz Reservists who in 1890-91 had undergone respectively their first or second training were out
Jägers, &c.	270	46	
Foot artillery	950	170	
Pioneers	550	74	
Total	10,500	1,600	

For a third (4 weeks') Exercise.

Infantry	8,060	1,210	in 1891-92 for their second or third training.
Jägers	240	40	
Foot artillery	800	140	
Pioneers	400	60	
Total	9,500	1,450	

Belgium .

Peace Organization.—The following changes have taken place in the constitution of infantry divisions and brigades in consequence of the completion of the works on the Meuse:—

Divisions.	Brigades.	Regiments.
1st Division (Ghent)	1st brigade	1st and 2nd Line Regiments.
	2nd „	3rd and 4th „
2nd „ (Antwerp)	3rd „	5th and 6th „
	4th „	7th and 8th „
3rd „ (Liége)	5th „	9th, 10th, 13th „
	6th „	11th, 12th, 14th „
4th „ (Brussels)	7th „	1st and 2nd Jägers.
	8th „	3rd Jägers, grenadiers, carbineers.

From this new distribution it will be seen that the number of brigades has been reduced by one.

The extraordinary budget for 1891 provided for the expenditure of between 23 and 24 millions of francs on barracks, defensive works, and fortress artillery; the greater portion of the money was allotted to the works on the Meuse. A serious debate took place on the subject in the House of Representatives. The expenditure on these works, which was in 1887 estimated at 24 millions of francs, gradually increased to 32 millions and then to 54 millions. In 1891 the faulty estimate was seen to be worse still, for the calculated expenses gradually rose to 61 and then to 71 millions. To the latter sum had to be added the compensation to be paid to the occupiers and the collieries on the Meuse banks.

The works are now practically completed. Some of the forts are occupied by batteries of the 8th Artillery Regiment, and the 13th and 14th Line Regiments will shortly garrison Liége and Namur. The armament of the forts has still to be completed. It is stated that by next spring all the guns will be mounted.

From a statement by the Minister of War it appears that, with the exception of a few redoubts at points the occupation of which is considered to be of special importance, no work is to be constructed at Antwerp that can be compared in importance with those existing.

Bulgaria and East Roumelia.

Peace Organization and Strength.—

Infantry, 24 regiments each of 2 battalions.

Cavalry, 4 regiments of 4 squadrons.

Body Guard, 1 squadron.

Artillery, 6 regiments of 2 batteries 9-cm., 2 batteries 8-cm., 1 battery 7-cm. (Of the 30 batteries, 24 are field and 6 mountain.)

Pioneers, 6 battalions of 2 companies.

Field telegraph, 1 company.

Field railway, 1 company.

Siege battery, 1.

In the summer of 1891 the peace strength was the following :—

1st Infantry Brigade (Sofia).....	4,170	men.
2nd " (Widdin)	3,952	"
3rd " (Rustchuk) ..	3,769	"
4th " (Schumla)	3,700	"
5th " (Philippopel)..	3,897	"
6th " (Slivno)	4,092	"
<hr/>		
Total infantry	23,580	"
Cavalry.....	2,910	"
Artillery	4,487	"
Technical troops.....	1,600	"
Flotilla	340	"
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Total all arms	32,917	"
And about 1,460 Officers.		

War Organization.

Infantry.—Each of the 24 regiments forms a 3rd, 4th, and a dépôt battalion; together 96 field and 24 dépôt battalions.

There are further 26,003 men of the 1878 and 1879 recruiting classes, who, having served 18 months with the colours, have, since 1887 or 1888 respectively, belonged to the Opoltschenie. From these men 24 Reserve battalions are formed.

The infantry, therefore, would consist of:—

Field battalions	96
Reserve field battalions....	24
Dépôt battalions.....	24
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Total battalions	144

Cavalry :—Each of the 4 regiments gives 2 Officers and several non-commissioned officers who form the nucleus for the formation of 6 new squadrons.

Artillery :—The existing 6 regiments remain unaltered; 3 regiments each of 4 batteries are formed from the 3 Reserve cadres.

The higher organization is the following :—

6 infantry divisions, each composed of 16 field battalions, 1 artillery regiment, and 1 squadron (of the 6 newly formed squadrons).

3 infantry Reserve divisions, each consisting of 8 Reserve battalions and 1 Reserve artillery regiment.

1 cavalry division of 4 regiments.

War Strength.—The following trained men are available on mobilization towards completing the formations specified above :—

	Infantry.	Cavalry.	Artillery.
1. With the colours (classes 1890-91)..	23,580	2,910	4,487
2. Reserve (classes 1880-89)	84,210	5,107	8,300
3. Opoltschenie (classes 1878-79)	26,000	—	—
	<hr/> 133,790	<hr/> 8,017	<hr/> 12,787
	<hr/> <div style="text-align: center;">154,594</div>		

But after deducting 5 per cent. from these paper numbers, about 6,000 more men will be required to complete the requirements of the infantry. There is no difficulty about getting these from the untrained or only partially trained men of the Opoltschenie, who number, exclusive of the 26,000 men of the trained portion, 161,700, of whom 73,000 are between 20 and 30 years of age. The remaining 88,700 are between 30 and 40.

Officers.—In order to provide each inferior unit of the mobilized force with four Officers only, there would be required 2,500 for the infantry, 100 for the cavalry, and 180 for the artillery. Exclusive, therefore, of the special branches, administrative services and Staffs, about 3,200 Officers would be required. The number available does not exceed 1,400; less than a half of the actual requirements.

Small Arms.—There are three patterns, viz. :—

Mannlicher (Austrian pattern).....	90,000
„ ordered for delivery	30,000
Berdan II.....	50,000
Krnka	100,000
Total.....	<hr/> 270,000

After the consignment ordered of the Mannlicher arm has been received, it will become possible to arm the whole of the 120 field battalions with this magazine arm. The 24 dépôt battalions and the Opoltschenie would be armed with Berdan and Krnka rifles. An order has been placed in Vienna for 70 millions of Mannlicher cartridges. Krnka ammunition in sufficient quantities is in hand; but this is not the case with Berdan ammunition. Guns have been ordered from Krupp for the three reserve artillery regiments, which would, if mobilized before their delivery, have to fall back on the 9-pr. bronze guns (12-cm.) left by the Russians.

Denmark.

Defences of Copenhagen, Land Side.—The land defences will practically be completed by the construction of the new works commenced last year. These are the following :—

1. On the left flank of the works, in the immediate vicinity of Kalvebodstrand, a coast battery, the guns of which will fire seawards.
2. On the right flank of the works, on the east flank of the

Christiansholm's lines, an open coast battery, the guns of which will fire seawards.

The fort of Garderhøj, built by public subscription, is completed, and will be fully armed in the course of a few months. The fort at Gammelmoesegaard, commenced by public subscription and taken over subsequently by the State, was completed in 1891 and is nearly ready for its guns.

France.

Amongst the changes that have taken place during 1891 are to be noticed the new formation of 3 cavalry and 1 infantry regiments, the addition of a 4th battalion to each of the infantry regiments from No. 145 to No. 162, and of a 5th battalion and a dépôt company to each of the two foreign regiments. A Bill was presented to Parliament for the formation of a Colonial Army, to which would belong both the existing marine infantry and marine artillery, the whole to be under the Minister of War so as to ensure a closer connection between it and the Regular Army. The principle of a Colonial Army for the protection and defence of the French Colonies and Protectorates, exclusive of Tunis, was provided for in the Organic Law of the 15th July, 1889. The proposals for carrying out this principle that were laid before the Chamber of Deputies last year were framed by a Committee composed of representatives of the Ministries of War, Marine, Home, and Colonies under the presidency of Lieutenant-General de Miribel, Chief of the General Staff.

Recruiting, 1890.—The statistics on this subject are of special interest, because 1890 was the first year in which the new arrangements for levying and distributing the annual contingent of recruits, under the Organic Law of 1889, came into force. The numbers to be dealt with were composed of men forming the 1889 annual class, and those of the 1888 and 1887 classes who had been put back the previous year. The 1889 class consisted of 310,275, 14,500 more than in the preceding year, amongst them 5,315 sons of foreigners, rendered liable by the Law of 1889; 8,683 failed to appear; 29,260 were pronounced to be unfit for any sort of service. This left 280,655 to be dealt with, of whom—

140,718 for 3 years' service.
44,316 „ 1 „

But there had further to be deducted—

32,741, who had already entered the Army,
39,997, put back,
22,792, fitted only for the administrative services,
91, excluded by reason of bad character.

And to be added—

19,592 of the 1888 and 1887 classes who had been put back.

Finally, the actual numbers liable and fit to bear arms resolved themselves into 204,986, viz. :—

134,056	for 3 years' service.
19,315	„ 2 „
60,615	„ 1 „

To these have to be added the men enlisting voluntarily, viz. :—

3,267	in the Navy,
7,691	„ marines,
25,267	„ Army,
5,103	„ foreign troops.

Thus the total strength of the year's contingent was, in round numbers, 242,700 men. At this rate nearly a million of men would be trained to arms in France in the course of four years. Of the 310,275 on the lists, 26,051 could neither read nor write, 32,689 could read, but not write. The average height was 5 ft. 4·72 ins., showing a very slight diminution on previous years.

Reserves.—L'Avenir Militaire (No. 1606, 14th August, 1891) reckons the whole strength of the Reserves to the Active Army, after making the usual deductions, at 1,248,000 men, and that of the Reserve to the Territorial Army, after the Organic Law of July, 1889, shall have been in force for twenty-five years, at 1,659,000 men. Including the 570,000 men with the colours, 1,181,000 men belonging to the Territorial Army, and the untrained men drafted on mobilization to the administrative services, the entire war strength of the French Army at the same period is estimated at 5,564,000 men.

The Reservists of 1883 and 1884 were called out for drill as follows :—

Infantry—

25th August to 21st September.	Reservists of the 1st, 2nd, and 3rd battalions, rifle battalions, Zouaves, Algerian tirailleurs. The drivers of S.A. ammunition wagons, who are non-commissioned officers, not employed at manœuvres in this capacity, were attached to an artillery regiment for the training.
7th April to 1st May.	Reservists of infantry not belonging to a corps.
1st October to 28th October.	Reservists belonging to the 4th battalions who have to take part in the drills of the “mixed” regiments.

Cavalry—

17th March to 13th April.	In two series.
14th April to 11th May.	

Field Artillery—

12th October to 8th November.

Foot Artillery and Engineers—
25th August to 21st December.

The Reservists of the train, administration, artillery artificers' companies, and the gendarmerie are all called up as found most convenient.

For the first time Generals Commanding corps were empowered to call up by personal notice a certain number of Reservists between the 1st April and the end of August, for a period of twenty-eight days.

The numbers to be called out, and for whose training provision was made in the Budget, were as follows:—

Infantry.....	4,375 Officers	225,107 men.
Administrative troops..	—	19,802 „
Cavalry	305 „	12,987 „
(Exclusive of 100 veterinary Officers.)		
Artillery.....	255 „	55,939 „
Engineers	173 „	7,076 „
Train	160 „	18,550 „

During the time of the training of the Reserves, provision was also made for the following to take part in special exercises with troops of the Active Army:—

- 45 Officers and 70 Surgeon-Majors with the cavalry.
- 1,540 Officers (only Sub-Lieutenants) and 38 Surgeon-Majors with the artillery.
- 35 Officers (only Sub-Lieutenants) with the engineers.

Cavalry Carbine.—The whole of the cavalry, including the cuirassiers, is in the course of being armed with a small-bore carbine, of new pattern. According to the press, the magazine is arranged for 3 cartridges. Each man is to carry 100 cartridges.

Defensive Works.—The following have been removed from the list of fortified places:—By the Law of the 27th January, the fortress of Douai, and the fort of La Scarpe; by the Law of the 2nd July, the fortress of Arras with its citadel, the redoubt of St. Catherine, and the smaller works appertaining to it.

At Belfort new works have either been planned or are in course of construction. According to statements in the *Progrès Militaire*, No. 1136 (23rd September, 1891), six new infantry works are to be constructed on the right banks of the Savoureuse, which will serve to strengthen and support Fort Salbert. They are to be situated in the vicinity of this fort and between Forts Vaudois and Giromagny, and offer safe cover to infantry inside the girdle of forts. The girdle road connecting the forts with one another and with the enceinte has been made. The removal of the portions of the enceinte that have been rendered unnecessary, owing to the construction of new works, has been commenced.

The military press reports further respecting the extension and strengthening of the fortresses on the eastern frontier. At Verdun also a new fort, St. Symphorien, has been constructed on the south front, one at Landrecourt, on the left bank of the Meuse, and several smaller works.

In the Alps, Fort Queyras has been built and furnished with covered batteries.

A strengthening of the fortifications of Cherbourg is in contemplation, and plans have been drawn up for the construction of new forts for the protection of the harbour, the town, and the fleet.

Railways.—Of the new lines completed and taken into use in 1891, those noted below are of special interest, from a military point of view.

1st. The section St. Florentin—Troyes of the great strategic line that connects Bourges by way of Auxerre and Troyes with the east frontier; the section Bourges—Clamecy is still in course of construction.

2nd. The section Lons-le-Saulnier to Champagnole, near the Swiss frontier.

3rd. The section as far as Brézel of the line Digne—Nice, which connects Lyons with Nice, by way of Grenoble.

A line of great strategic importance which will connect Paris directly with Rheims, is, according to the *Progrès Militaire*, No. 1122, being constructed. It branches off at Trilport from the section Paris—Châlons-sur-Marne, passes by La Ferté-Milan and Parmentiers, and joins at Basoches in the valley of the Vasse with the line from Soissons to Rheims. The establishment of a second communication by rail between Toul and Nancy—the previously existing one goes round by Frouard—was undertaken last autumn. It branches off from the section Nancy—Mirécourt at Pont-St. Vincent, and runs directly thence to Toul; the line is double.

Staff.—A Decree of the 3rd January, 1891, completed that of the 6th May, 1890, on the subject of the constitution of the Staffs of the Army.

1st Part.—*Service in Peace.*—The following belong to the Staffs:—

1st. The “Maison Militaire” of the President and the Staff of the War Minister.

2nd. The General Staff of the Army.

3rd. The Staffs of the Military Governments of Paris and Lyons.

4th. The Staffs of Army Corps, divisions, infantry and cavalry brigades.

5th. Those of territorial divisions and brigades.

6th. The Officers attached to the Marshals of France, and to certain General Officers specially employed.

7th. The Officers attached to Embassies abroad.

8th. The Staffs of artillery and engineer commands.

To the General Staff belong:

- i. Certificated Officers (of proved fitness for the duties of the General Staff) who are placed *hors cadre*;

- ii. Twelve superior Officers, who form the cadre for survey services ;
- iii. Officers selected for employment in special situations and detached from their corps ;
- iv. Archivists.

A General of Division is placed at the head of the General Staff as its Chief, with Brigade Generals and Colonels as Sub-Chiefs.

The other Staffs are composed of certificated Officers placed *hors cadre*, of certificated Officers detached from their corps, of orderly Officers, and Archivists.

The Chief of the General Staff is charged under the authority of the War Minister with the superintendence of all matters connected with General Staff services. Under him are placed all the certificated Officers and those uncertificated Officers employed on the Staff, the Archivists and interpreters; the whole of the personnel of the Geographical Service; the superior War Schools (exclusive of the students); those Officers of the Reserve and the Territorial Army who in time of war would be employed on the Staff; the Étappen, or railway services. His sphere extends further to superintending the training of the General Staff Officers, and to matters connected with the Geographical Service and the superior War Schools.

Every year the War Minister settles and publishes the conditions of entry to these schools. The course lasts two years, at the conclusion of which the examinations for the certificate are held. All the Officers who obtain the certificate are attached for two years' duty with the Staff; during this time they have two exercises with troops of those arms to which they do not belong. Superior Officers and Captains are permitted to undergo special examinations for the certificate without having passed through the school.

The Colonels, Majors, and Captains of the General Staff, who are certificated, have directly on their promotion to the ranks named to do regimental duty in their rank for two years. The 12 superior Officers employed in the Geographical Section are alone exempted from this rule.

The orderly Officers on the Staffs of General Officers are to be taken from certificated Captains and Lieutenants.

The Chief of the General Staff of an Army Corps is responsible for the service of the Staff, and for the training of the Officers placed under him. The Sub-Chief is the assistant and representative of the Chief. A superior Officer is placed at the head of each section of the Staff. The other Officers and the Archivists are distributed by the War Minister on the recommendation of the General Commanding. The orderly Officers form the private Staff of the General Commanding, who employs them as required.

The distribution of Staff duties is as follows :

1st Section (Active) : General correspondence, training, and operations, personnel, discipline, and administration.

2nd Section (Territorial) : Organization, recruiting, mobilization, local affairs, military establishments, and defences.

The Staffs of Divisions, &c., are arranged on similar principles.

2nd Part.—Services in War.—To the Staffs “with the armies” belong :

The General Staff of the superior headquarters.

The Staffs of the Army commands.

„ „ Army Corps, divisions, and brigades.

„ for special formations (Reserve, siege, and cavalry corps).

„ for Étappen and railway services.

„ for artillery and engineer commands.

„ of the commands in fortified places.

The Staffs “in the interior” consist of :

The Staffs in the regional commands.

„ for the dépôt commands.

„ of the artillery and engineer commands.

„ „ commands in fortified places (so far as these do not already exist in peace).

In war the duties of the Army Corps are divided into three heads :

1st. The duties connected with the organization, states, appointments, supply, ammunition.

2nd. Intelligence.

3rd. Operations.

The allotment of the Staff to the several formations is the following:—

Army Corps : 2 Colonels or Lieutenant-Colonels.

„ 2 to 3 Majors.

„ 3 Captains.

„ 2 orderly Officers.

Division : 1 Lieutenant-Colonel or Major.

„ 1 to 2 Captains.

„ 1 orderly Officer.

Brigade : 1 orderly Officer.

To the Staff of each Army Corps are attached two or three Archivists, and to each division or brigade that comprises a territorial command one Archivist. They have the rank and position of Officers, and number in all 183, divided into principal Archivists, and those of the 1st, 2nd, and 3rd class.

Organization.—The infantry was increased by 23 battalions; of these 18 were added to the regional regiments, 3 went to form the new 163rd Regiment, and 2 were added to the foreign regiments. In the reasons set forth in the Bill for forming 4th battalions to the regional regiments, the desirability of having only one sort of infantry regiment is dwelt on.

The new organization of the 18 regiments (Nos. 145 to 162) render that number of battalions available to receive the excess of Reserve men that will be shortly forthcoming under the operation of the 1889

Law. It is further desirable to attach in peace men to the cadres of these 4th battalions, to be taken at first from the total effectives of the infantry. The present number of battalions in the regional regiments is too small to provide sufficiently for service in fortified places; consequently battalions from other regiments have hitherto had to be employed for this purpose. By the changes contemplated the increased cost would be small, for the intention is to decrease at the same time the "cadres complémentaires" of the 144 sub-divisional regiments in non-commissioned officers and men, who would be transferred to the regional regiments.

To form the new 163rd Regiment, which was assigned to the 59th Infantry Brigade (30th Division, 15th Army Corps), with its quarters at Nismes, a company was taken from each of the regiments of the 15th Army Corps, and three companies were taken from the 16th Army Corps.

By the Law of the 21st June, 1890, the article of the 1875 Law was abolished that forbade the assembly together in peace-time for instructional purposes of bodies of troops belonging to the Territorial Army and bodies of the Active Army. The introduction of this change was facilitated by the circumstance that the first two battalions of each territorial regiment are formed from the youngest classes, and include only men who have served a complete three years with the colours. Further, these battalions, together with the 4th battalion of the corresponding Line regiment, consisting in peace only of the "cadre complémentaire," being raised on mobilization to war strength by means of Reserve men, form the "régiments mixtes" with the numbers from 201 to 345; they are, in effect, Reserve infantry regiments. During 1891, of the whole 144 regiments, 72, or one-half, being all those bearing uneven numbers, were called up for exercises of fourteen days' duration. This was the first occasion on which regiments of Reserve had been embodied.

The 1st battalions were formed of Reserve men of the 1883 and 1884 classes, who filled up the "cadre complémentaire" of the corresponding Line regiment; the 2nd and 3rd battalions were formed of men of the Territorial Army of the 1878 and 1879 classes, and furnished with Officers from the Territorial Army. The average strength of companies was 150 men. The battalion Commanders and Captains were provided with horses by the mounted branches. This year (1892) the regiments with even numbers are to be trained and formed into divisions, with cavalry and artillery attached for manœuvres.

Employed Men.—In a circular issued from the War Office last October, stringent directions were given to reduce the number of soldiers in employment by which they are withdrawn from the ranks. Soldiers are no longer to be permitted to give their services to theatres or public displays. Guards are only to be exceptionally provided for civilian and fiscal buildings.

The number of sentry posts and the number of soldiers employed as clerks and orderlies in offices are to be reduced. Permanent orderlies are not to be furnished for offices; but four men may be selected to succeed one another, a different one each day. If a daily

change be impracticable, it must be carried out every fourteen days. The number of acting bandsmen per regiment (3 battalions) is to be reduced to 24, and no soldier is to be employed as such until he has completed his military training.

All detached men, whose employment is not specially provided for, are to be drilled once a week; no man is to be excused musketry.

Cavalry Organization, &c.—During the year three new regiments—the 30th Dragoons, 13th Hussars, and 13th Cuirassiers—were formed. All regiments of the same nature had to contribute to their formation, either in the form of complete squadrons, or of subdivisions of men taken by lot. This increase brought up the number of cavalry regiments to 87, of which 77 are stationed in France, and 10 in Algeria and Tunis. Of the 77 in France, 38 belong to the Army Corps, and 39 to the cavalry divisions.

Those with Army Corps are formed into brigades each of 2 regiments; the cavalry divisions, 6 in number, vary in strength from 3 to 4 brigades, each of 2 regiments. The headquarters of the cavalry divisions are at the places stated below:—

1st Cavalry Division	.....	Paris.
2nd „ „	.....	Lunéville.
3rd „ „	.....	Châlons-sur-Marne.
4th „ „	.....	Sedan.
5th „ „	.....	Melun.
6th „ „	.....	Lyons.

The Law of the 25th July, 1889, authorized the creation of 13 new cavalry regiments, which were to be gradually raised. Up to the end of 1891, 9 of these had been formed, and the formation of 2 dragoon regiments, 1 cuirassier, and 1 hussar regiment, is to be proceeded with during 1892, and they will, it is assumed, form a 7th Cavalry Division.

As in the infantry, so also in the cavalry “régiments mixtes” (reserve regiments) have been formed. In each corps cavalry regiment, two squadrons (a 6th and 7th) are to be provided for from Reserve men, which will form, together with two squadrons composed of men belonging to the youngest classes of the Territorial Army, a “régiment mixte.”

Each of these regiments is permanently attached to an active regiment of the corps cavalry brigade for purposes of administration and mobilization.

The available strength of the arm on mobilization will thus be the following in future:—

Independent cavalry divisions	.....	42 regiments.
Corps cavalry brigades	.....	38 „
Reserve cavalry regiments	.....	38 „
Territorial cavalry	.....	76 squadrons.
„ „ „	.....	38 Ersatz squadrons.

Artillery.—The following particulars regarding the distribution of

the artillery on the east frontier are taken from statements in French military papers:—

Besides the field artillery of the 6th Army Corps (6th Brigade, with the 8th and 25th Regiments on the higher peace establishment), the following batteries are stationed in the 6th Region:—

8 horse artillery batteries (the 12th Batteries of the 10th, 32nd, 35th, 23rd, 27th, 24th, 34th, and 38th Regiments; of which 3 are attached to the 2nd, 2 to the 3rd, and 3 to the 4th Cavalry Division). 2 Batteries, the 9th of the 6th and 36th Artillery Regiments, which, in conjunction with the 7th and 8th Batteries of the 25th Regiment, form in Demiremont and Brugères, the group of the Vosges batteries.

The 1st, 2nd, and 3rd Batteries, 15th Regiment, in Verdun.

„ 7th, 8th, and 9th „ 38th „ in Toul.

„ 7th, 8th, and 9th „ 24th „ in Châlons Camp.

„ 7th, 8th, and 9th „ 35th „ in St. Michel.

The total number of batteries, therefore, in the 6th Region is 46, of which 11 are horse artillery.

The artillery in the frontier arrondissement of Belfort, belonging to the 7th Region, has been increased by 4 batteries, and since the beginning of March 13 batteries have marched into the frontier districts.

Training.—By an instruction of the 11th February, 1891, the practical training of the artillery is to be extended, so as to include the making of fascines and other revetting materials, the construction of gun emplacements, field service duties in the country, exercises in shooting, loading up railway transport, and the use of explosives.

In the Châlons Camp an exercise, lasting eleven days, took place of the whole of the batteries of the 7th and 19th Artillery Brigades, and of the 2nd and 3rd Cavalry Divisions, in all 52 batteries, representing the artillery of an Army Corps of war strength. Smokeless powder was employed, and the batteries fired massed against indicated objects answering to service conditions; the reconnaissance and occupation of positions, and the supply of ammunition were practically carried out on the ground. To enable the replenishment of ammunition to be practised, three artillery ammunition sections were employed. The exercises were superintended by Lieutenant-General de la Hitte, President of the Artillery Committee. A detailed account of them is to be found in the September number of the “*Revue d'Artillerie*” for 1891.

Medical Services.—The following has replaced Article 16 of the 1889 Regulations:—

The medical Service embraces the duties in the first line and those in the rear of the army.

To the former belong:

1st. The regimental service, destined to afford the first assistance to the sick or wounded, whether in quarters, on the march, or in action; the regimental Surgeons, with the sick attendants and bearers of the troops at hand provide for this.

2nd. The ambulance service, which, in concert with the regi-

mental service, provides for getting the wounded under cover; and attending on them until they can be handed over to the field hospitals.

3rd. The field hospitals, which come into operation in the vicinity of the battlefield, have to take over the treatment and care of the wounded.

The medical services in rear of the army embrace :

1st. The provisional stationary field hospitals, in which the wounded and sick who cannot bear removal are treated.

2nd. The convalescent depôts, for the reception of those who will be fit for duty again after a few days' rest and treatment.

3rd. The evacuation hospitals, which receive from the field hospitals and ambulances those patients who are capable of transport, in order to transfer them as quickly as possible to the establishments in the interior.

4th. The trains for their transport by rail to the rear, and the railway station hospitals.

Non-commissioned Officers.—The number who re-engage voluntarily on the expiration of their legal term with the colours has been constantly on the increase since the Law of the 18th March, 1889, which offered material advantages at once to the re-engaged non-commissioned officer, besides the prospective advantages of a post in the civil service and pension.

In 1889 the number who re-engaged was 4,118, whereas in 1890 it was 8,126; and on the 1st January, 1891, the entire number serving who had re-engaged was 24,003, distributed as follows :—

Infantry	13,717
Administrative troops	1,919
Cavalry	3,203
Artillery.....	4,127
Engineers	508
Train	529

In the Budget of 1892 provision has been made for a further total increase of 2,000.

By the Law of 1889 the re-engagement of a non-commissioned officer is cancelled if it should become necessary to inflict on him a punishment in excess of sixty days' imprisonment. But in order also to dispose of any non-commissioned officer who by reason of his misconduct may be thought to be unworthy of retaining his position, Courts of Enquiry, in a certain sense Courts of Honour, were introduced last year. In an infantry regiment, for example, they are to be composed of the Colonel, 2 Battalion Commanders, 4 Captains, and 2 non-commissioned officers. The arraignment of a non-commissioned officer before such a Court is ordered by the General Commanding the corps or the Military Governor, when the former has conducted himself in a manner unsuitable to his rank, has been guilty of gross negligence in the performance of his duties or of an infraction of discipline, which are punishable by more than three months or by reduction, or of violating their parole. The proceed-

ings are verbal, but secret. The Court have to give their opinion whether the individual concerned appears unworthy to continue a non-commissioned officer, and if he should be dismissed or reduced. The confirmation is reserved for the General Commanding or the Military Governor, as the case may be. The military press reports favourably on this new procedure.

A Ministerial instruction regulates the appointment to the civil service of entitled non-commissioned officers, who must be of exemplary character and under 40 years of age. The appointments are classified in four categories, according to the degree of knowledge and general instruction possessed by candidates. For appointment to one of the first three categories, it is necessary to pass an examination, on the results of which the classification is based.

Units of the Active Army.—On the 31st December, 1891, the French Active Army consisted of:—

584 battalions.
435 squadrons.
480 field batteries.
100 fortress batteries.
116 companies of technical troops.
75 train companies.

The troops assembled in the 6th Region amounted to 89 infantry battalions, 100 squadrons, and 46 batteries, 11 of which are horse artillery.

The formation of a 20th Army Corps in this frontier region, which has been spoken of by the press for two years past, was not carried out in 1891; but it was considered imminent.

Territorial Army.—Not much progress appears to have been made in the constitution of Territorial rifle battalions, though a beginning has been made in the 14th and 15th Army Corps districts. It has now been settled as a permanent arrangement that the men belonging to the Territorial Army of the classes liable to training shall be called up in alternate years, those belonging to regiments bearing even numbers in the even years, those belonging to regiments of uneven numbers in the odd years.

The Budget for 1892 provides for the means of training the following numbers of the Territorial Army, the Officers for a period of fifteen days, the men for thirteen days.

Infantry	6,922	Officers,	110,522	men.
Administration troops ..	—		6,631	„
Cavalry	648	„	6,995	„
Artillery	1,040	„	2,778	„
Engineers	212	„	3,806	„
Train	271	„	8,608	„

Besides these numbers, 12 superior Officers, destined to be Governors of fortified places in war, 45 cavalry Officers, and 600 Sub-Lieutenants of artillery and 35 of the engineers were called up for

special courses. The training of the battalions formed is stated to have been carried out under difficulties which made it hopeless to expect satisfactory results. Amongst these difficulties have been indicated the weakness of the battalions, the fact that Territorial lists of the other arms are included amongst them, the insufficient training of the instructors, and the shortness of the period during which they were up.

The composition of the Territorial Army on the 1st November, 1891, was the following:—

- 145 infantry regiments of 5 or more battalions, of which the first two belong to the “régiments mixtes.”
- 10 battalions of Zouaves.
- 150 squadrons, of which 72 belong to the “régiments mixtes.”
- 18 artillery regiments and 13 foot batteries (Algeria).
- 18 engineer battalions.
- 18 train squadrons.

Greece.

Organization.—The scheme introduced in 1887 is still in force; but a Committee has been sitting to consider the subject of reorganization in the Army. Under existing arrangements it consists of:—

Infantry	10 regiments, of 3 battalions, of 4 companies.
Rifles	7 battalions, of 4 companies.
Cavalry	3 regiments, of 4 squadrons.
Artillery	3 field artillery regiments.
Engineers ..	1 regiment, of 2 battalions, of 4 companies.
Train	1 company.

The nominal peace strength of an infantry battalion is 406 men, exclusive of Officers; that of a rifle battalion 443, including Officers. On mobilization the strength of the company is raised to 250, and there is power in that event to form 15 new battalions, which would bring the entire strength of the infantry to 53 battalions—in round numbers, 53,000 men. The prescribed strength in peace of a squadron is 128 men and 100 horses; but the effective in both is much less. On mobilization the squadron is raised to a strength of 175 men and 150 horses, and 1 new squadron per regiment is formed. The whole strength of the cavalry, therefore, would be 15 squadrons, or about 2,250 sabres. In the artillery the 1st and 2nd regiments have each 4 field and 3 mountain batteries; the 3rd regiment is composed of 2 field, 1 mortar, and 3 mountain batteries. The peace strength of a field battery is 132 men, 64 horses, 6 guns (Krupp's 8.7-cm.), and 6 ammunition wagons. That of a mountain battery is 122 men, 18 horses, 30 mules, 6 guns (Krupp's 7.5-cm.), and 7 two-wheeled ammunition wagons. In the event of war the deficiencies in the regulated establishments would be completed and further batteries formed. Men, guns, and equipment are available for 10 batteries, but great difficulty would be experienced in obtaining the required teams.

The nominal peace strength of an engineer company is 119 men, to be raised to 250 in war.

No arrangements have been made to provide the increased number of Officers that would be required in war.

The gendarmerie consists of 15 Officers, 3,376 men foot, and 256 men mounted.

The recruiting contingent varies from 10,000 to 11,000 men.

The regulated peace strength for the several arms is the following:—

Infantry	16,361 men.
Cavalry	1,608 „
Artillery	3,382 „
Technical troops	1,040 „
Gendarmerie.....	3,743 „
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Total	26,134 „

As a fact, in consequence of the numerous furloughs and desertions, the effective strength has not, for years, exceeded 18,000 or 20,000 men. On the 1st October, 1891, it was 19,952, including Officers. On paper there are 150,747 men belonging to the Reserve; but on the occasion of the last mobilization, in 1885, after eight yearly classes had been called up, only 30,000 men rejoined, instead of 60,000, as was expected.

It may be taken, however, that within six weeks the Greek mobilized army would number 85,000 men, and it might, in favourable conditions, with money and time available, be raised to 120,000, which is the maximum attainable strength. The quality of the army leaves much more to be desired than its quantity. Apart from the shortcomings in the matter of the special administrative services, which would, on mobilization, seriously affect efficiency, there are other causes at work, political for the most part, which prevent any solid progress being made in the improvement of the army and its training.

The actual value of an army can only be found by a comparison being made between it and its natural and probable opponents. The natural opponents of Greece are Turkey and Bulgaria. But if one compares, critically and without bias, the Greek Army with the armies of the two States named, it will be found not to equal them either in numbers, organization, or training.

Austria-Hungary.

During 1891 the completion of the organization which had been actively carried on during the two preceding years was continued extensively. The reorganization of the field artillery, accompanied by an increase of both the peace and war effectives, the new distribution of the train troops in connection with the new regulations for supply in war, the creation of a 96th Infantry Brigade command at Zara, the institution of fortress artillery inspections at Vienna and Buda-Pesth, and

the separation of the functions of the Inspector-General of Remounts from those of the military Inspector of the Horse-breeding Establishments were the more notable changes in matters connected with organization. As regards regulations, there are to be noticed the musketry instruction for the cavalry armed with the magazine rifle, a revised edition of the first part of the artillery drill, and new instructions for fortress artillery practice :—

Strength: Peace—

Army service.....	16,993	Officers,	259,874	men.
Austrian Landwehr	1,573	„	9,514	„
Hungarian „	1,993	„	16,204	„
Bosnia-Herzegovina	176	„	2,860	„
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Together	20,735	„	288,452	„

War—

Unattached.....	7,980	Officers.		
Army, including Reserve..	23,031	„	939,884	men.
Austrian Landwehr	3,190	„	192,800	„
Hungarian „	3,408	„	234,554	„
Bosnia-Herzegovina	—	„	18,400	„
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Together	37,609	„	1,385,638	„

Magazine Carbine.—The whole of the cavalry regiments of the Army and both Landwehrs are armed with the small-bore magazine carbine, firing exclusively cartridges with smokeless powder.

Machine Guns.—The Maxim 8-mm. has been introduced and exhaustive instructions regarding it have been issued. They are to be employed only in fortress warfare on the defensive, for strengthening points where a heavy infantry fire is desirable, but cannot be secured from the absence of infantry positions, and also, though only exceptionally, in support of infantry fire.

The machine gun therefore serves :—

1st, like infantry fire, to sweep from the walls the nearer, and in certain cases the more distant, ground outside ;

2nd, to increase the power of resistance against assault of defensive works constructed only during a war ;

3rd, for employment in positions between forts to increase their security ;

4th, to sweep communications, flank entrances, and defend sections ;

5th, for mobile employment, requiring only to be sent to a place and brought into action when really required. For instance, to strengthen the fire power of certain localities or of the infantry fire in positions in the ground lying immediately in front and in intermediate positions ;

6th, to sweep the ditch and flank the gorge of permanent or provisional works against assault.

Supply in War, and the Reorganization of the Train.—The division of the latter into three regiments, with their headquarters at Vienna, Buda-Pesth, and Prague, remains unaltered. Each regiment has

4 to 5 train divisions of 5 to 7 train squadrons. The peace strength consists of 14 train divisions, 80 train squadrons, 15 Ersatz dépôt cadres for train divisions, 3 Ersatz dépôt cadres for regiments. Together these amount to 322 Officers, 2,800 men, 1,501 horses, and 36 pack animals. Besides these formations there are two special train sections in Bosnia and Herzegovina, as well as train matériel dépôts at Klosterneuberg, Buda-Pesth, and Sarajevo.

In war a train squadron is allotted to the superior headquarters and to each Army Corps and division command. The train squadron for headquarters consists of 2 subdivisions, of which the 1st is attached to the operating headquarters, and the 2nd to the General Étappen command. The train squadrons with army commands have 4 subdivisions, of which the 3rd and 4th form the supply train. The train squadrons with Army Corps commands have each 6 subdivisions; of these the 3rd and the 6th form the supply train, the 6th carrying exclusively preserved provisions.

Equally the train squadron of an infantry division consists of 6 subdivisions. The squadron command is at the same time the train command of the division. The 1st subdivision (1 Subaltern Officer, 102 men, 166 horses) carries the wagons of the division and brigade staffs, of the divisional sanitary establishments, of the sanitary column of the German "Ritter" order, of the field post, the staff troops, and the Generals. Attached are 3 civilian vehicles for the personal effects of Chaplains, Auditors, and officials; also when the roads are bad 21 requisitioned spare wagons.

The 2nd, 3rd, 4th, and 5th subdivisions (each 1 Subaltern Officer, 12 men, 8 horses), with 82 civilian vehicles per subdivision, carry each a relay of the infantry supply column; each of these relays carries a one day's supply for 17,700 men, 22,000 draught and 1,300 civil horses. The 6th subdivision (1 Subaltern, 34 men, 16 horses) carries on 152 civil wagons three days' supply of preserved provisions for the foregoing numbers of men and horses. This reserve relay is in three parts, each one of which carries the supply for one day.

The train for a cavalry division is formed and subdivided on similar principles, with certain differences in detail.

The field supply magazines number 14, each of which is divided into 15 relays, 5 for each of the 3 infantry divisions of the corps. The first 4 relays carry each one day's supply, the 5th three days' supply of reserve or preserved provisions. One of the relays carries besides the one day's supply and the three days' reserve provisions for the corps, Army, or superior headquarters, and for the troops of the command concerned not comprised in the divisions.

Consequently the troops have with them, exclusive of what they carry on their persons or their horses, and in their immediate provision trains, provisions for 14 days, of which 6 are preserved. By this means provisions are guaranteed for from 19 to 20 days.

Each field supply magazine is accompanied by a train escort squadron consisting of a squadron staff (Captain, Veterinary Surgeon, 9 men, 11 horses) and 15 subdivisions. The 15th has 1 Subaltern, 49 men, 22 horses, and 215 civil wagons; the 13th and 14th have

each 1 Subaltern, 30 men, 16 horses, and 152 civil wagons ; the 3rd, 6th, 9th, and 12th subdivisions are composed in the same manner, only that they have 28 wagons less ; all the other subdivisions are of similar strength to the subdivisions Nos. 2 to 5 referred to above.

The new organization of the supply establishments is in close relation to that of the train. By means of changes in their subdivision and constitution they have been given increased mobility, while at the same time the troops have been afforded greater independence in respect of their supply.

The supply establishments consists of military supply magazines and branch magazines in peace-time, to which are added in war the mobile and stationary field supply establishments.

The mobile establishments comprise (i) the infantry supply columns, (ii) the cavalry supply columns, (iii) the corps supply columns, (iv) the supply trains of the Army commands and of the Commander-in-Chief, and the field supply magazine, (vi) the field bakery, (vii) the cattle depôt, (viii) the *Étappen* supply train.

To the stationary field supply establishments belong: 1st, the reserve supply magazine ; 2nd, the reserve bakeries ; 3rd, the reserve cattle depôt.

The advantages which the new supply columns offer, as compared with the former ones, are obvious. Instead of carrying supplies for four days they provide for seven days' maintenance, and by this means the independence of the divisions in regard to their supply is materially increased and operations facilitated. On the other hand, the new supply columns, owing to their subdivision into relays, each containing one day's supplies, are less ponderous, and possessed of increased mobility.

Reorganization of the Field Artillery.—The number of guns is 1,912, exclusive of the reserve guns attached to the Reserves, the sortie batteries, and the machine guns belonging to fortified places. Each of the 14 corps artillery regiments is composed both in peace and war of 2 battery divisions, each of 3 batteries of 8 guns (9-cm.) ; together, 672 guns. Each of the 42 independent battery divisions attached to the infantry divisions consists of 3 batteries of 8 (in peace only 4, except in Galicia and Bukowina) guns ; making 1,008 guns. Each of the 8 horse artillery battery divisions attached to cavalry divisions is composed both in peace and war of 2 horse batteries of 6 guns ; together, 96 guns. In peace there is one mountain battery of 4 guns with each of 12 corps artillery regiments ; in the event of mobilization a second battery of a similar nature is added to each, so that the organization provides for 96 guns of mountain artillery in war. Lastly there is in the Tyrol an independent mountain battery division, consisting in peace of 3 batteries of 4 guns and in war of 6 batteries, also 4 narrow-track field batteries of 4 guns ; together, 40 guns. As in peace there are only 4 cavalry divisions (in Cracow, Vienna, Lemberg, and Jaroslau), and the others are formed only in brigades, the horse artillery batteries are in peace attached to 8 of the corps artillery regiments.

The reorganization secured also for the artillery a uniform calibre.

The field, horse, and narrow-track batteries have throughout 9-cm. guns. The mountain batteries alone, the guns of which have to be capable of transport by pack animals, are of 7-cm. calibre. Temporarily the horse batteries have still their former guns (8-cm.), but they are to be replaced by the 9-cm. gun in the course of 1892.

A further advantage has been secured, by the abolition of the reduced establishment on which certain of the batteries used to be kept. The independent battery divisions No. 29 to No. 42 are destined for 14 divisions of Landwehr which would on mobilization be incorporated in the field army. As these Landwehr (or Honvéd) divisions would, on account of their reduced peace strength, not have completed their mobilization until some days later than the divisions of the Regular Army, it used to be thought sufficient to keep the batteries that would accompany them on a reduced strength of only 2 guns. This unsatisfactory arrangement has now been abolished, to the advantage of good training and efficiency on mobilization.

It is also of importance that the distinction between the artillery Reserve establishments of the 1st and 2nd line has been done away with. The completion of ammunition is effected simply from the nearest ammunition park. The arrangement by which mountain ammunition field depôts are to be established for troops operating in mountainous districts is also new. The amount of ammunition to be carried by the artillery reserve establishments has been materially increased. The divisional ammunition park carries 110 rounds per gun, and 57 rounds per rifle. The corps ammunition park has 110 rounds per gun of the corps artillery, and 27 for each rifle of the troops belonging to the Army Corps. The Army ammunition park contains 36 rounds per gun and 26 rounds per rifle or carbine of the Army.

The divisional ammunition park comprises one infantry and one artillery ammunition column. The corps ammunition park consists of one infantry and two artillery ammunition columns. An attempt has been made to keep down as much as possible the number of wagons, notwithstanding the increase effected in the quantity of ammunition carried. Thus, for example, the corps ammunition park and the cavalry division park together consist of 232 vehicles, 12 wagons less than under the previous organization. This has been made possible by the introduction of a new pattern of ammunition wagon.

The following is the composition of each corps artillery regiment in peace: (i) the regimental staff; (ii) the 1st and 2nd battery division, each of 3 batteries, with the numbers 1 to 3 and 4 to 6; (iii) the cadre of the ammunition park; (iv) the Ersatz depôt cadre; there are further in immediate connection with these regiments: (v) to each of the corps artillery regiments Nos. 1, 2, 4, 5, 6, 7, 10, and 11 is attached a horse artillery battery division with the number of the corps artillery regiment to which it is attached. Each consists of a battery division staff and 2 horse batteries numbered 1 and 2; (vi) to each of the regiments Nos. 1 to 3 and 6 to 14 is attached a mountain battery numbered 1.

Each of the 42 independent battery divisions is divided into: i, the Staff; ii, 3 batteries, numbered 1 to 3; iii, the ammunition park and Ersatz dépôt cadres, from which, on mobilization, the divisional ammunition park, consisting of an infantry and an artillery ammunition column and the Ersatz dépôt, are formed. The divisional ammunition parks bear the numbers coinciding with that of the battery division from which they are formed, viz., from 1 to 42. With an army in the field the 1st and 2nd battery divisions of the corps artillery regiments are designated the corps artillery; the battery divisions 1 to 42 as the divisional artillery of the infantry and Landwehr divisions; the 8 horse artillery batteries as the divisional artillery of the cavalry divisions.

The corps and divisional ammunition parks would be attached to the same troops as the batteries of the formations from which they are derived. The cavalry divisional ammunition columns are generally attached to the cavalry division having the same number as the horse artillery battery division to which they belong.

The independent mountain battery division in the Tyrol is constituted as follows: i, the divisional Staff; ii, 3 mountain batteries with mixed mountain equipment, numbered 1, 3, and 5. On mobilization they are doubled, and batteries numbered 2, 4, and 6 are formed, the Ersatz dépôt cadre, from which is formed on mobilization the Ersatz dépôt for the division, and from it 4 narrow-track field batteries.

In each Army Corps, with the exception of the 15th (Bosnia-Herzegovina), the corps artillery regiment and the independent battery divisions allotted to divisions of infantry and Landwehr belonging to the Army Corps are formed into an artillery brigade that bears the number of the Army Corps concerned. In peace each artillery brigade is quartered in the territorial area occupied by the corps.

The artillery reserve establishments of an army in the field consist of, 1st, the mobile establishments, viz., (i) the mountain division ammunition parks, (ii) the divisional ammunition parks, (iii) the corps ammunition parks; and 2nd, (iv) the army ammunition field dépôts and (v) the mountain ammunition field dépôts.

Each army ammunition park is divided as follows: 1st, the Staff; 2nd, reserve ammunition columns, equal in number to the Army Corps; 3rd, a reserve column of implements required for the manipulation of the ammunition and stores of matériel in the park.

The completion of the ammunition expended by the troops will, as a rule, be effected by the company ammunition wagons of the infantry and rifles or by the battery wagons of the artillery, as the case may be, directly from the divisional (corps) ammunition parks, in such a manner that it shall generally be obtained from the ammunition establishments of the Army Corps to which the troops requiring the ammunition belong. But if troops find themselves in the vicinity of ammunition columns not belonging to their particular Army Corps, they may, if they require it, indent on them for ammunition.

The divisional (corps) ammunition parks draw the necessary supplies to complete from the army park, and also eventually direct

from the army ammunition field depôt. The army park fills up also from this source. These latter consignments are forwarded by rail, ship, or hired transport, formed in convoys of from 35 to 40 wagons.

Generals or Staff Officers of artillery will be attached to the higher commands and Staffs of an Army in the field to assist with their advice in regard to artillery matters. They are: i, for the Army command, the Chief of Artillery for the Army; ii, for the Army Corps commands, the artillery Brigadiers; iii, for the divisional commands and divisions forming a part of the Army or Army Corps, the Commandants of artillery battery divisions; iv, for the general Etappen command of the Commander-in-Chief, an artillery Officer attached for the purpose.

Landsturm.—The organization of the Landsturm, introduced both in Austria and Hungary a few years ago, has been materially strengthened since, especially in Hungary, where the formation of Landsturm regiments of 3 to 4 battalions, and of Landsturm hussar squadrons in each of the 7 Honvéd districts, has been actually carried into effect. From the younger classes of Landsturm men, viz., those between 33 and 36 years of age, who have served in the Army or the Honvéd, 8 infantry brigades (60 battalions) and 10 squadrons have been organized. Their strength would be 1,000 men per battalion, and 150 sabres per squadron; and not only has the necessary provision of arms, clothing, and equipment stores been made, but they are provided with Officers and Staffs, so that on the fifth day from the men being called up and the horses collected they will be ready to march. The remaining 124 Hungarian Landsturm battalions and 15 squadrons have indeed the full war strength of non-commissioned officers and men, while a sufficient quantity of stores are ready for them in the magazine; but the establishment of Officers is as yet very incomplete. In the case of the Austrian Landsturm battalions there is no deficiency in this respect; the war establishment of Officers is complete in the 92 field battalions, and there is only a small deficiency in the 92 territorial battalions.

As regards the men, the number borne on the rolls is so great that the combination of the supplementary company to be formed by each Landsturm battalion with two or three such other companies would make it possible to form 50 or 60 more battalions.

Cavalry Carbine Instruction.—The issue of the small-bore repeating carbine to the cavalry has necessitated a new edition of the instructions regarding musketry training in that arm. With the normal position of the sight (500 paces) the limit of short range is 600 and of medium range 1,200 paces; the greatest range provided for by the sight is 2,400 paces, and the extreme range 5,500 paces. The lowest sight, 300 paces, is only to be used when shooting at single soldiers; otherwise the normal position (fixed sight) is to be employed at distances up to 600 paces. Judging distance up to this distance at intervals of 100 paces is to be practised by all soldiers. Soldiers who show special aptitude for judging distances correctly are to be trained as thoroughly as possible. The 1st (lowest) class fires, as a preliminary,

5 rounds at 200 and 5 at 300 paces (4 or 8 in the infantry) standing and kneeling, at an ordinary target, followed by 5 series of 5 rounds at half and entire figures; the last two series are at 500 and 600 paces at 2 or 3 figures placed close together. Soldiers who, in these 5 series, make 40 per cent. hits pass into the 2nd class; those who fail remain in the 1st class, and fire in it again the following year. The 2nd class fires 10 rounds as preliminary practice at the ordinary target, followed by 5 series of 5 rounds at third and half figures, entirely disappearing, and 2 figures placed close together. Those who in the regular practice make 50 per cent. hits are nominated marksmen. They form the 3rd class, and shoot the same preliminary practice as the 2nd class, and afterwards fire at moving, half and entirely disappearing figures and at 2 disappearing figures placed close together.

In long-range firing 3 distances over 1,000 paces, 1 between 1,800 and 2,400 (in the infantry 2,500) paces are to be selected. The simultaneous employment of two different sights (mixed sights) is to be adopted when the estimated distance lies between two distances as marked on the sight, or when the object is moving from or approaching towards the firer; also at a stationary object when required to neutralize the uncertainty of the distance estimated, wind, temperature, &c. The preliminary practice is restricted to ranges up to 400 yards.

Roumania.

The year 1891 was an important one by reason of: i, the decision regarding the supply of armoured towers and guns for the fortifications of Bucharest; ii, the adoption of the Mannlicher rifle; iii, the reorganization of the infantry.

The system on which the defensive works about Bucharest should be erected was decided as long ago as 1885, and consisted mainly in the construction of 36 forts on a circumference distant from 7 to 9 km. from the *enceinte* of the city. The first of the forts constructed were made with deep ditches and masonry scarps and counterscarps, in accordance with the accepted principles of the day; each were to hold 2 companies, or about 500 infantry men, and to mount from 20 to 30 guns, mostly situated behind breastworks and exposed. Fortunately only 4 out of the 36 projected forts had been commenced when, in 1886, the French experiments with high explosives against Fort Malmaison at La Fère proved, without any doubt, that other principles must be adopted. The Roumanian Government recognized that armoured towers must be made use of to protect the guns, and exhaustive trials were entered on with a view to deciding the best type of tower. The results of these trials were in favour of a pattern which was last year finally adopted, and the following orders were placed, all with French firms:

34	armoured towers,	each for 2 15-cm. guns.
18	„ „	for 1 15-cm. gun.
26	„ „	for 1 21-cm. howitzer.

126 sunken armed towers for 1 5·7 quick-firing gun.
 392 caponier carriages for quick-firing 5·7-cm. guns.

There still remain to be ordered :—

38 towers for 1 21-cm. howitzer.
 6 ,, ,, 15-cm. gun.
 54 armoured look-out stations.
 400 quick-firing 5·7 guns.
 Ammunition.

The following was reported in the press to be the state of the earthworks themselves :—Forts Kitila (on the Verchowa-Jassy road) and Giliva (on the Giurgevo road) were finished in the spring of 1891; six others would, it was estimated, be completed in the spring, and a like number in the autumn, of 1892. But the execution of the orders given for the matériel cannot be completed within less than five to six years, until which time the further orders to complete this matériel are not to be placed. It appears, therefore, to be probable that the 19th century will have come to an end before the entrenched camp of Bucharest will be finished and the works completely armed.

Reorganization of the Infantry.—Hitherto the infantry consisted—exclusive of 6 rifle battalions that are not affected by the new arrangements—of 8 Line and 33 Dorobanz regiments, all of 2 battalions. Each of the 4 Army Corps was therefore composed of 2 Line and 8 Dorobanz regiments (the 33rd Dorobanz Regiment, lately formed in the Dobrudscha, was extra) in 5 brigades, therefore, including the rifles, 21 or 22 battalions. The line regiments had a permanent establishment, they were recruited from the whole Army Corps territory, and were stationed in the principal towns. The men served 3 years with the colours, and then passed to the Reserve for the remainder of their 9 years' service. The Dorobanz regiments had only two permanent companies each, whilst the remaining companies were only embodied during short periods for training and exercise. Their period of service with the colours was for 5 years, so they belonged to the Reserve for 4 years.

Under the new organization, the line regiments have been done away with and distributed by battalions, as 3rd battalions with a permanent establishment, which included the previously existing two companies, to the Dorobanz regiments. For the purpose there were available the previously existing 8 line regiments = 64 companies, and the 2 permanent companies of the 32 Dorobanz regiments = 64 companies, together 128 companies = 32 battalions. The 33rd Regiment in the Dobrudscha forms its own Line battalion, which its extensive recruiting area enables it to do unassisted.

In each of the 33 territorial districts a number of recruits are called up for 3 years' service with the permanent battalion; the remainder are called up to the other two battalions with variable establishment, of which usually only the cadres exist, and come up only for periodical training. From them, however, are drawn any

men required in the course of the year to supply the place of the casualties that occur.

The men of the permanent battalions after serving 3 years are dismissed on permanent furlough for 4 years, during which time, unless in the event of a mobilization, they are called up only for the great manœuvres. The men of the battalions with variable establishment serve 5 years under the conditions specified above, and then are on furlough for 2 years. The whole of the men, therefore, during the last 2 years of their service belong to the Reserve, and are relieved of liability to come up for any training.

The entire requirements for the mobilization of the troops of the first line are satisfied by the seven youngest classes, viz., the men with the colours and those on furlough. The two classes forming the Reserve remain available for new formations for Ersatz and garrison purposes. To this end a *depôt cadre* is formed in each regiment with which to raise a 4th battalion, to be commanded by a Reserve Officer.

In connection with the reorganization of the infantry, the composition of an Army Corps was fixed as follows:—

- 2 infantry divisions, each of 2 brigades.
- 1 or 2 rifle battalions.
- 1 Kalarasch brigade of 3 regiments (Militia cavalry, 4, 5, or 6 squadrons per regiment, of which one is permanently formed).
- 1 regiment of Roschori (regular cavalry).
- 1 artillery brigade.
- 1 engineer battalion.
- 1 train squadron.

Russia.

Organization: Infantry.—Although the number of Army Corps has remained the same as in 1890, viz., 17—exclusive of the Guard, Grenadier, and Caucasian Corps—still, preparations have been begun for increasing it and organizing all the Army Corps (except the Guard and the Grenadier Corps) in 2 infantry divisions only. The whole number of these divisions belonging to the field Army is still 41, exclusive of the 3rd Guard and the 5th Grenadier Divisions. Of these infantry divisions the 1st Army Corps alone has now 4; all the others have already only 2. The 24th Division, which has hitherto been quartered in Finland, has been withdrawn without relief, and it seems possible that a new 18th Army Corps may be formed from this and the 3rd Division, hitherto belonging to the 1st Army Corps. This would dispose of 36 (or 37) of the infantry divisions, and leave 4 still available. Of these 2, the 20th and 21st are in the Northern Caucasus, the 40th is in the military district of Kasan, and the 38th, hitherto at Kutais, is now provisionally at Kief. The 40th Division in Kasan will be retained there, presumably as an independent field division, and the 24th Division will have to be replaced by another. But it is possible that, if wanted, the 20th and 21st Divisions might

be moved west, and, with the addition of the 38th Division, form a 19th or 20th Army Corps.

A similar increase might be effected in the number of Army Corps without the assistance of these field divisions by means of the reserve cadre troops, regarding the utilization of which an important step was taken last year. In February, 1891, a new infantry regiment, Kowell, No. 165, of 4 battalions, was formed from the 40th Reserve Regiment, of 2 battalions, and attached to the 11th Division, which now alone has 5 regiments. It was thought that this would be followed by the conversion of other Reserve regiments into infantry field regiments; but this has not been the case, probably from motives of economy. But in April, 1891, 20 Reserve battalions (these battalions are distinguished now by their names; they no longer have numbers) were increased to 6 companies. Almost simultaneously 12 Reserve regiments of 2 battalions were formed from the existing Reserve battalions, and were numbered from 166 to 177 (they also bear territorial titles, thus: 172nd Reserve Infantry Regiment: Pultusk), thus following immediately after the last numbered Line regiment. The regiments thus constituted were further formed into 3 Reserve infantry brigades, numbered similarly from the last of the Line brigades. Thus, besides the 41 field divisions, there are now 42nd, 43rd, and 44th Reserve Infantry Brigades. The establishment of a Reserve regiment of 2 battalions is 40 Officers, 3 officials, and 1,555 men; therefore, in men almost that of a German infantry regiment, and only 340 men less than the Russian infantry regiments of 4 battalions. The organization of the Reserve troops (including natives) in the Caucasus has now been generally carried out, and it was owing to this having been done that it became possible to withdraw the 38th Infantry Division. No such extension can be given at present to the Asiatic Reserve troops, as the men for the purpose are not forthcoming.

Cavalry.—Hitherto there were in Russia, exclusive of the Guard and the Army of the Caucasus, 14 Army cavalry divisions, of which the first 3 regiments consisted of dragoons, and the 4th of Cossacks. Besides these, in European Russia there were permanently embodied 1 Don Cossack division and 1 combined Cossack division, the latter located on the west frontier, and both regarded as Regular troops. The number of Army Corps, including the Guard and the Grenadiers, is 19. There is not, therefore, a cavalry division for each Army Corps, even supposing the Guard to give up one of its Cavalry divisions for Army purposes. In 1891, therefore, a new 15th cavalry Division was formed, to consist provisionally of the 47th and 48th Dragoon Regiments (formed from squadrons transferred from other regiments) and the 3rd Ural Cossack Regiment. This newly formed cavalry division has been allotted to the 15th Army Corps, in place of the 13th Cavalry Division, which has been placed directly under the Commander of the Warsaw military district.

The only Army Corps still left without cavalry are the 1st (Petersburg), for the 1st Cavalry Division is allotted to the Grenadier Corps; the 13th (Moscow); the 16th (Witebsk); the 17th (Nijni

Novgorod), but for this there is an extra Cossack division in the Kief district. In the event of war, arrangements would no doubt be made to attach portions of cavalry to the Army Corps and divisions as divisional cavalry.

One other point to be noticed is the abolition of the post of Inspector-General of Cavalry (also of Engineers), and the staff belonging to it. On the decease of the late Inspector-General, his functions were taken over by the War Office, where a special Committee for cavalry was instituted. The actual inspection of the arm is now carried out by Officers nominated for the purpose.

Artillery.—The number of field artillery batteries has not been increased, but a large number of those located on the west frontier have been increased from 4 to 8 horsed-guns. In the reserve artillery, however, there have been some new formations. Since July, 1891, a 7th battery has been formed in the 4th and 5th Reserve Artillery Brigades. During 1892 the 3rd Reserve Brigade is equally to form a 7th battery in peace with two horsed-guns. The 5th and 6th Batteries of the 2nd Reserve Brigade have been given an increased establishment.

As regards garrison artillery, the former 3 battalions forming the 12 companies of the Kars-Alexandropol Garrison Artillery have been converted into the Kars Garrison Artillery, consisting of 3 battalions, containing 12 companies, and the Alexandropol Garrison Artillery, composed of 3 companies. The 3 mountain batteries stationed at Kief have been formed into a separate regiment with a park. A new garrison artillery battalion of 4 companies has been formed for Zegrsze.

It is to be observed that the tendency in Russia is more and more in favour of giving up the distinction between heavy (position) and light batteries, and only to keep the latter, which have a sufficient power, greater mobility, and can carry more ammunition, and to introduce more mortar regiments, of which there are already three.

Engineers.—From the 1st January, 1892, only the sapper battalions belonging to the 1st, 3rd, 5th, and Caucasus Sapper Brigades are to consist of 5 companies; all the other 6 battalions are to consist of 4 companies each. The previously existing 5th companies of these battalions have been formed into fortress engineer companies for Düna-burg, Kovno, Ossovjez, Novogeorjevsk, Warsaw, and Ivan-gorod. From the 1st Sapper Brigade have been newly formed a fortress company for Cronstadt and a fortress command cadre at Viborg; from the 3rd Sapper Brigade a company for Brest-Litevsk and a cadre for Dubno; from the 5th Brigade a company for Sevastopol; and from the Caucasus Brigade cadres for Kertch and Otschakov.

The following, therefore, is now the state of engineer formations in Russia:—17 sapper battalions of 5 or 4 companies; 8 pontoon battalions of 2 companies; 1 Turkestan sapper half-battalion; 3 sapper companies for East and West Siberia and Transcaspia; 9 fortress companies, and 4 cadres and 1 technical company.

On mobilization, each battalion that has a 5th company forms with

it 2 reserve companies, except the 1st and 13th battalions, which form 1 reserve and 1 fortress company. By this means, 20 reserve and 2 new fortress companies (for Sveaborg and Bender) are obtained. The fortress companies that exist during peace are expanded in war into 2 companies, and the existing cadres form half companies.

With a view to the formation of bodies of Ersatz troops, the 1st, 2nd, 3rd, and 5th Sapper Brigades detach, on mobilization, Officers and men sufficient to form cadres for 4 Ersatz battalions, each of 4 companies. These battalions have two different establishments, a permanent and a variable one. The reserve sapper companies are in war employed either with the reserve infantry divisions or in connection with the siege of fortresses in rear of the Army. The Ersatz battalions send drafts to replace casualties in the front. The fortress companies provide for engineer services in the fortified places.

Reserve Officers.—Since 1886 the lowest grade included amongst the corps of Officers with the active Army has been Sub-Lieutenant (in the cavalry, Cornet). Previous to that year there was a lower grade, corresponding to the German “Fähnrich,” or Ensign. This class has, since 1886, existed only in the Reserve, and is composed of those who, having served with the active Army as one- or two-year volunteers, have, on their transfer to the Reserve, passed a simple qualifying examination. But owing to the progress made with the Reserve formations it was found that the Officers drawn from all sources, including these Ensigns, were, for the infantry, quite insufficient. To meet this difficulty, a still lower grade of Officer has been created, for war only, who occupy the position of cadets (“sa urjad praportschik,” literally “provisional Ensign”). They are selected from non-commissioned officers with special qualifications.

Switzerland.

Organization.—After some opposition, a scheme was last year adopted for the amalgamation of the then existing 8 independent divisions into Army Corps. It provided for 4 Army Corps, each of which was to consist of the following:—

- 2 infantry divisions.
- 1 cavalry brigade.
- Corps artillery.
- Corps park.
- Bridge train.
- Telegraph company.
- Administrative services.

Artillery.—In 1890 the creation of fortress artillery was decided on. No such formation existed previously, but the necessity for it arose when the new fortifications were constructed on the St. Gothard. The formation, therefore, of 4 companies was undertaken, to be distributed as follows:—

- 1 company for Airolo (Fondo del Bosco).
- 2 companies for Andermatt (Bühl and Bätzberg).
- 1 company for Oberalp-Furka-Gotthard.

The strength of a company was fixed at 200 to 250 men, including 10 to 12 Officers.

Magazine Rifle.—The 1889 pattern has been adopted, but its manufacture is very slow. The whole of the Field Army will not be armed with it until towards the end of next year. The arm is very well reported on, and it promises to take a high position amongst the small-bore magazine rifles adopted by other States. A practised man can fire with it, in one minute, 12 aimed shots, if used as a single loader, 20 by the aid of the magazine, and 30 in rapid firing (by mechanical contrivance). The rifle can be reloaded without bringing it down. The magazine, situated under the lock, contains 12 cartridges, and can be very easily replaced.

Rifle Practice.—Great facilities and encouragement are afforded in Switzerland by the voluntary shooting clubs. They increase every year, and in 1889 numbered 2,919, with 134,767 members.

Strength of the Armed Forces, 1st January, 1891.—

127,000	men in the Field Army (age 20 to 32 years).
80,272	„ Landwehr (age 33 to 44 years).
272,124	„ Landsturm (age 17 to 20 years, 45 to 50 years, Officers to 55), of whom 82,436 are armed.

The Landwehr take some part in the annual training and manœuvres, but in time of peace the men belonging to the Landsturm receive no instruction, excepting that in some cantons arrangements have been made for them to attend voluntarily for the purpose.

Servia.

Terms of Service.—In the Standing Army, 10 years, from the completion of the 20th year until the completion of the 30th year; in the 1st levy of the popular Army, 10 years, between 30 and 40; in the 2nd levy, 10 years, between 40 and 50. The period to be passed with the colours is fixed at 2 years, but there are shortened periods of 1 year, of 5 months, and of 1 month. On the completion of the term with the colours the men are passed to the Reserve.

The shortened 1 year's service is permitted in the cavalry for those men who can turn out a horse equipped in accordance with the regulations, and after 5 months and 11 months respectively pass the examinations required for promotion to be a lance-corporal and to be a non-commissioned Officer.

The 5 months' period is applicable only to certain classes of men having specially urgent calls upon them in civil life.

Those only are dismissed after a month's training who are the sole support of a wife and child or of a member of their family unable to work and over 60 years of age.

Organization.—There are 5 divisional districts, each of which, in peace-time, supports the following formations :—

- 1 infantry regiment of 3 battalions.
- 1 infantry Guards battalion.
- 1 to 2 squadrons of cavalry.
- 1 field artillery regiment, with 6 batteries, each of 4 guns.
- 1 mountain battery of 4 guns.
- 1 engineer company.
- 1 train squadron.
- 1 sanitary company.

The Royal Horse Guards, the garrison artillery, the horse artillery battery, some technical formations, and the gendarmerie are recruited from the whole kingdom.

In war, every infantry battalion is converted into a regiment of 4 battalions by the formation by each company of 1 battalion. Thus each of the 5 division districts produces 3 regiments of 4 battalions, and the entire infantry of the Standing Army consists of 60 battalions Line and 5 battalions Guard, which are not increased in number on mobilization, but are only raised to war strength. In the cavalry a 4th squadron is added to each of the 3 regiments, and, besides this, 2 squadrons of divisional cavalry are newly raised in each district, thus increasing the cavalry to 23 squadrons, including the Guards squadron. In each of the 5 field artillery regiments 2 new batteries (7th and 8th) are formed; the 5 mountain batteries are increased by 4, and there is in addition the 1 horse battery, total 50 batteries, each of 6 guns.

The 15 infantry battalions permanent in peace form 15 Ersatz battalions, one each, and each of the 5 Guard battalions forms an Ersatz company; there are formed also in each division district an Ersatz squadron and an Ersatz battery.

Neither levy of the Popular Army has any cadre in peace. All the formations, therefore, have on mobilization to be inaugurated. The Officers alone are nominated beforehand. In each division district the following units are to be constituted from men of the 1st levy:—3 infantry regiments, each of 4 battalions; 1 Guards battalion; 2 squadrons of divisional cavalry; 1 field artillery regiment of 4 batteries with 6 guns; also some technical and other formations. From the 2nd levy are formed in each district 3 infantry regiments of 4 battalions; 1 squadron of divisional cavalry, and 1 company of garrison artillery.

Officers.—The official list comprises altogether about 2,000 Officers of all arms on the active and reserve list; but it is to be observed that this number falls far short of the requirements of the entire mobilized Army. In the middle schools there are courses for Reserve non-commissioned officers, and at the University an Officers' course. Students who have passed these schools enjoy the privilege of voluntarily entering the Army after completing eighteen years of age, and availing themselves of the shortened period of service, after which they have to pass the prescribed examination. Other

candidates for the position of Reserve Officer who satisfy the necessary conditions in regard to efficiency are also admitted to the examination. The Reserve Officers rank after those on the active list, and their promotion is carried out in accordance with a separate seniority list.

The Commanders of regiments and the superior Commanders and their Staffs for the national levies are drawn exclusively from the Active Army. In so far as the remainder of the posts are not provided for by Officers drawn from the Active Army or the Reserve, they will be filled by the appointment of old Army non-commissioned officers, and other qualified individuals selected from the several corps, as may be decided beforehand. The authority for their appointment rests, in the case of the leaders of subdivisions, with the Commander of the division concerned; in that of company Commanders, with the War Minister; the appointment of battalion Commander rests with the King. These Officers may be required to improve their knowledge by attending the Officers' course of instruction that has lately been instituted.

Infantry Arm.—The arms in possession are all of the old large bore, and of several different patterns, viz.:—

- i. 104,000 Mauser-Kola-Milovanovitz (10·2 mm.).
- ii. 72,000 Berdan (10·6 mm.), bought from Russia last year.
- iii. 91,000 Peabody-Martini (11·3 mm.).
- iv. About 50,000 Krnka, Snider, and old muskets.

Those at i are for the Standing Army; at ii, for the 1st levy; and at iii and iv, for the 2nd levy of the National Army.

The question of rearming the forces with a small-bore magazine rifle, or of converting the existing arm (i) into a repeating rifle, was last year under discussion, but was postponed without any definite decision having been arrived at, on account of the difficulty in regard to money.

A vote of 10 million dinars (a dinar is about a franc) towards rearmament was passed by the Skupschina; but of this sum 4 millions were devoted to other purposes, and the remainder was required for the rearmament of the field artillery, and the provision of guns of position and quick-firing guns.

The existing field gun on the de Bange system has been a failure, for up to the present in peace-time as many as eighty have broken down and become unserviceable. The choice of the gun to replace it lies between Krupp's and Canet's systems.

Horses and Train.—The weakest point in the constitution of the Servian Army is the inadequate arrangement for the supply of the horses and wagons that would be required in war. The existing peace establishment consists of 1,700 troop, and 1,400 draught horses, of which only 30 per cent. are fit for war service. The war requirements may be taken as the following:—

For the Standing Army	9,000
„ 1st national levy	6,000
„ 2nd „	1,500

The required number of train vehicles and draught animals may be estimated at some 16,000 country carts, and 32,000 oxen or buffaloes. The horse conscription made in 1886 provided, indeed, 35,000 horses, but the quality is bad, so that the war requirements in the interior could scarcely be met. But carts with the regular country teams are available in sufficient numbers to meet the requirements for the train.

Establishments.—i. *Peace.*—The regulated strength is the following :—

Officers, Surgeons, and officials ..	1,400
Men.....	19,000
Horses	9,200
Horsed guns	146

But as a fact the effective strength never amounts to anything like these numbers. During the last two years it has not been more than 1,100 Officers, &c., 9,000 to 9,500 men, and 3,000 horses.

ii. *War.*—Standing Army: 65 infantry battalions, 23 squadrons cavalry, 50 batteries field and mountain artillery, 60,000 rifles, 4,300 sabres, and 300 guns.

National Army: 1st levy, 65 infantry battalions, 10 squadrons cavalry, 20 batteries, 56,000 rifles, 1,180 sabres, and 120 guns.

National Army, 2nd levy: 60 infantry battalions, 5 squadrons cavalry, 53,000 rifles, and 800 sabres. Together, 190 infantry battalions, 38 squadrons cavalry, 70 batteries; 169,000 rifles, 6,280 sabres, and 420 guns.

These numbers are imposing, and if they could be relied on in their entirety, would indicate an important increase on the forces hitherto available. In the course of the Russo-Turkish war, Servia gradually placed in the field about 110,000 men; but in her latest war (with Bulgaria) it was not possible to mobilize more than about a half of this number, and at the present time it may be accepted that Servia would not do much more than she did then. On mobilization, by about the twelfth day, the Active Army could be mobilized; but from the numbers given above, 20 per cent. at least would have to be deducted for casualties, on account of absentees, sick, &c., which would leave, perhaps, 50,000 fit for service. After about a month, in the most favourable conditions, some 40,000 to 45,000 men of the 1st levy might be organized, and in two months from 35,000 to 40,000 men of the 2nd levy. These numbers together would amount to from 125,000 to 130,000 men, and this is probably the greatest number that could gradually be embodied by Servia to resist any serious attack such as would threaten her existence as an independent State.

Spain.

The reorganization of the Army was last year effected on the lines stated below, and the changes inaugurated by it came into force on the 1st July, 1892. The Peninsula, together with the Balearic and

the Canary Islands, was divided into 111 zones. The size of these corresponds to the number of men borne on the lists of the district, which is not to exceed from 6,000 to 7,000 in each district. The annual contingent numbers about 700 to 800 men per district.

On an average, 86,634 recruits are taken yearly for the Army, of whom 6,634 are required for the force stationed out of the country and for the marines.

The period of service lasts twelve years; consequently in war the Army should consist of 12 yearly contingents of 80,000 = 960,000 men. But from this number has to be deducted 20 per cent. for casualties, &c., leaving 768,000 men available, which is still further reduced to 680,000 to allow of the margin it was thought necessary by the War Minister to allow.

The country is further divided into 16 military recruiting districts, each of which provides for one division, the headquarters of which are situated in the district. Each of these comprises a certain number of zones.

The garrison artillery recruits by battalions, of which there are 10 in the divisional district or districts allotted to them.

Each zone is commanded by a Colonel, who has under him 2 Lieutenant-Colonels, 2 Majors, 6 Captains, 2 First Lieutenants, 3 sergeants, and a number of corporals and privates. These form in part the cadre of a *depôt* battalion, and also regulate and look after the recruiting lists, the calling up and distribution of the recruits, the men on furlough, and the Reservists of the 1st and 2nd classes. There is further in every zone a Military Statistics and Requisitions Committee, composed of cavalry Officers and the necessary number of men.

The previously existing 68 Reserve regiments, 58 3rd battalions of the active infantry, 10 *depôt* rifle companies, 28 Reserve cavalry regiments, 7 recruiting and Reserve artillery *depôts*, and 4 Reserve regiments of engineers have been done away with.

Infantry.—Composition, 16 divisions of 2 brigades each of 2 regiments of 3 battalions. Provisionally the rifle battalions are to take the place in certain divisions of infantry regiments that have not yet been formed. In peace-time the 3rd battalions will consist only of a permanent cadre, which on mobilization would be expanded by means

Reserve men of the 1st class. At the present time there are 56 line regiments garrisoning the Peninsula, 2 in the islands, and 3 in North African possessions. The 2 regiments in the Balearic Islands form an independent brigade, and the rifle battalions in the Canaries a half brigade. The whole of the troops are furnished with the vehicles they will require on mobilization, the horses for which would be obtained by requisition.

The peace strength of a Line regiment will in future be 54 Officers and 824 other ranks; the company is consequently about 100 strong. In war it is 250; the total strength of the regiment is then raised to 84 Officers and 3,026 other ranks.

Cavalry.—Although 16 of the existing 28 cavalry regiments are to be attached to the divisions, still the cavalry is in peace to form still

10 brigades, which are distributed to the several division districts. In war, out of the regiments still available, will be formed a cavalry division of 6 regiments; 5 will be attached to the Army Corps that will then be created, and the squadrons at Majorca will provisionally form the reserve. Every cavalry regiment will consist of 4 active and 1 *depôt* squadrons; also 1 escort section. The squadron, 114 strong in peace, is to be raised to 175 on mobilization.

The establishment of a regiment is in peace 38 Officers and 460 other ranks; in war 47 Officers and 770 others.

Artillery.—The number of field artillery regiments has been increased by 4, making a total of 16 regiments, of which 9 are to be armed with 8-cm. guns, 5 with 9-cm. guns, and 3 with 8-cm. mountain guns. In peace each regiment consists of 4 batteries of 6 guns and 1 ammunition column; in war there are 8 batteries of 6 guns as well as 2 artillery and 2 infantry ammunition columns. Besides the field artillery regiments, there are to be 3 batteries of horse and 10 battalions of garrison artillery.

The field artillery regiments have a peace strength of 35 Officers and 513 (or 573 for those with 9-cm. guns) other ranks, which is increased for war to 76 Officers and 2,096 (or 2,248 for those with 9-cm. guns) others. The composition of the regiments of mountain artillery differs little from that of the field.

The peace strength of a horse battery is 4 Officers and 115 others; in war 5 Officers and 173 men. These batteries are armed with 6 8-cm. guns.

Of the garrison artillery one battalion (the 1st), consisting of 6 companies, has in peace 34 Officers and 630 other ranks; in war the number of Officers is not changed, but the other ranks are increased to 1,519. The remaining 9 battalions have a peace strength of 25 Officers and 426 other ranks; in war the numbers are raised to 30 Officers and 1,026 others.

Engineers.—This arm consists of 1 telegraph battalion, 1 railway battalion, 1 pontoon regiment, and 4 regiments of sappers, 1 company of which is allotted to each infantry division.

The telegraph battalion has in peace 29 Officers and 626 men; in war 75 Officers and 1,250 others. The railway battalion consists in peace of 27 Officers and 806 men; in war of 32 Officers and 1,045 men.

The peace strength of a regiment of sappers is 49 Officers and 806 men; in war the number of Officers remains the same, but the other ranks are increased to 2,006.

Sanitary and Administrative Formations.—These have been completely reorganized, and are to consist of a brigade of 16 companies, one to each of the divisions.

The strength of the brigade in peace is 4 Medical Officers, and 1,033 others. In war each company forms 2 brigade ambulances and 1 divisional ambulance.

Besides the medical personnel and administrative officials, there are with each ambulance 170 of all ranks, also 60 bearers, 49 drivers and leaders for the mules, 30 vehicles, 60 draught and 37 pack mules.

The administrative troops are formed on the same lines, in a brigade of 16 companies, of which 1 is attached to each division during peace. Fourteen of the companies are mounted, and the other 2 are mountain companies. For service in the Balearic and the Canary Islands there is a mounted section, and a mountain section for North Africa. The establishment in peace is 18 Officers, 1,436 men; 24 troop and 8 Officers' horses, 384 mules, 82 field ovens, 60 carts, and 600 baggage wagons; in war 126 Officers, 4,845 men, 277 troop and 83 Officers' horses, 3,892 mules, 70 field ovens, 2 carts, and 20 baggage wagons.

Turkey.

Strength.—In consequence of the reinforcement of the troops in Yemen during the course of the year, the number of combatants in the Turkish Army was increased to 185,000 men; the total rationed strength, including all non-combatants, was about 250,000.

The estimates that have appeared in various publications of the strength of all the armed forces available are excessive. The following appears to be the paper strength of the several portions composing these forces:—

1st, <i>Muassaf</i> (<i>Active Army</i>):	
i. Permanent list of Officers and of non-commissioned officers serving beyond their legal period as candidates for appointment as Officers	25,000
ii. Six yearly classes, 1st category, 1st portion	240,000
iii. Six yearly classes, 1st category, 2nd portion	30,000
Together	295,000
2nd, <i>Redif</i> (<i>Landwehr</i>):	
The 1st, 2nd, 3rd, 4th, and 5th Corps furnish at present each 64 Redif battalions of 1,000 men.....	320,000
The 6th Corps has only 17 battalions	17,000
Active Army and Redif together.....	632,000
Ditto, after deducting 15 per cent. for absentees, casualties, &c.	537,000
3rd, <i>Mustahfiz</i> (<i>Landsturm</i>):	
The six yearly classes after allowing for absentees, casualties, &c. They have no cadres or organization	120,000
Total.....	657,000

To this number might be added about 150,000 men from all sources, volunteers, irregular troops, &c., thus giving three quarters of a million of men, who might in time be utilized in the event of a great war in which the existence of Turkey was at stake. This is not unsatis-

factory if the losses in territory, and consequently in men, which she has suffered be taken into consideration. Turkey may be well satisfied if at the commencement of a war she is able to put in the field 400,000 men, as she did in the Russo-Turkish War, with the knowledge that in the course of the war she could count on the services of nearly as many again,

Reorganization.—The introduction of a three years' period of active service, prescribed by the Recruiting Law of 1887, has not yet been given effect to. At the present time there are four annual classes with the colours. The number of men, estimated at 23,000, of the Tertib-sani (Muassaf: 1st, category, 2nd portion) has fallen far short of this estimate. In 1888 they numbered 14,000, of whom about the half were called up, and were kept three to seven months longer under arms than the five to seven months' training prescribed by the law. Those called up in 1889, about 4,000, have not yet been dismissed. The rest of the 1889 class and all that for 1890, together about 5,000 men, were employed to complete the establishments of the troops employed in quelling the insurrection in Yemen. The training of the Kiam-sani, the men of which are not called up at all, the restricted training prescribed by the law has not been carried out. In the same way the regulated exercises for the Redif have been entirely neglected, which is to be particularly regretted, looking to the numerous occasions on which partial mobilizations have during late years become necessary.

Reserve Officers.—On the occasion of the last partial mobilization on a large scale (1885–86 conflict with Greece), some of the Redif regiments had to march with only 10 or 12 Officers. The Reorganization Committee considered how best to remedy this unsatisfactory state of affairs, and drafted regulations providing for the selection after examination of suitable non-commissioned officers during peace for appointment as Officers of Redif. They have been referred back twice for revision, and for a long time allowed to drop; but they have been taken in hand again lately.

Recruiting Districts.—Five years ago sanction was given for the 192 previously existing recruiting districts to be divided, each into two, and for the boundaries of the new districts to be drawn according to the conditions of population. The changes have not yet been carried out, and only in September, 1891, was an order issued for their adoption in the 1st, 2nd, and 3rd Army Corps, the headquarters of which are at Constantinople, Adrianople, and Monastir. The delay has been caused by various unforeseen difficulties, and it has been necessary to obtain complete statistical information and proposals from the several Army Corps commands. In the first three the arrangements for effecting the change are now in course of execution. In the 4th Army Corps (Erzeroum) the new map is being drawn up; in the 5th (Damascus) the statistical researches have not as yet been completed; and in the 6th (Bagdad) nothing whatever has been done, and it is dubious whether the change will be effected at all.

The early completion of this reorganization of the recruiting districts is urgently necessary, both in the interests of recruiting in

peace and of an eventual general mobilization. Many of the old recruiting districts are too large, some are too small. The company districts also are in many cases too extended or too far distant one from the other. The Sivas district in Asia Minor has 32,000 men on the register, Adrianople has 9,000, Van, in Asia Minor, only 8,000. Yet all have to furnish on mobilization an equal number of troops. It follows, as was observable on the occasion of the partial mobilization of 1885–86, that whereas in the one district the task was simple, and rapidly completed without hardship to the inhabitants; in the other, instead of days, weeks were occupied by the mobilization, which then was only completed by means of undue pressure and much hardship.

Strength of the Active Army.—There were in 1891, 7 Army Corps, the headquarters of which were respectively at Constantinople, Adrianople, Monastir, Erzeroum, Damascus, Bagdad, and Yemen. There were besides 3 independent divisions in Crete, Arabia, and Tripoli. The total number of units in these commands was 281 battalions, 195 squadrons, 15 horse, 152 field, and 41 mountain batteries.

Infantry Arm.—The situation has not been changed, and it is not at all a satisfactory one. There are in possession the following different patterns :—

i. Mauser, Belgian, M/1888, small-bore	30,000
ii. „ M/1887, large-bore	220,000
iii. Henry-Martini	510,000

The intention has been to convert the Henry-Martini into a small-bore arm; but it appears that only about 60,000 are new, and the remainder have experienced much rough usage between the Russo-Turkish War and the various partial mobilizations that have since taken place. On the other hand, the Mauser M/1887 have never been issued. They might therefore be converted, and the Reserves armed with the unaltered Henry-Martini, if arrangements cannot be made for the purchase of 250,000 to 300,000 more Mausers M/1888 for their use.

The case of the ammunition is even worse : some 83 million cartridges have been delivered for the Mauser M/1887 and a further consignment of 17,000 has to be completed. No cartridges whatever have as yet been ordered for the M/1888 rifle, and the nature of the smokeless powder to be employed with them has not been decided on.

Fortifications.—The defences of Erzeroum, commenced in 1883, were in the main completed, so far as the construction of the works is concerned, five years later. But they are in great part useless, owing to the want of guns for their armament. The system of defences comprises citadel, enceinte, advanced works, and an intrenched camp. Of these the intrenched camp includes 13 forts, the armament of which was fixed as long ago as 1882 at 163 guns (24-, 18-, 15-, 12-, and 9-cm.), 116 mortars of heavy calibre, and 69 quick-firing guns. But the whole of the ordnance available for arming the entire defences only amounts to about 400 guns and mortars, of which about 50 are Krupps.

The new forts have the gorge closed, they are cut in the rock or well covered by masonry, have well secured underground shelter and magazines, and may be considered generally as capable of a good defence. The extent occupied by the intrenched camp is too great; for at least 25,000 men would be required even for a purely passive defence. In laying out the forts too much was attempted; in some cases, where two forts have now been constructed, one on a carefully selected site would have sufficed. But in general, when it shall have been fully armed and provided with a sufficient army both for the defence of the works and for offensive operations, Erzeroum will fulfil the object for which the works have been constructed. It is the key of Armenia and Anatolia.

As regards the works on the Bosphorus, the Rumeli Kavak battery, commenced some years ago, is not yet completed.

In the Persian Gulf orders were issued in 1891 for the reconstruction of the works of Beriman and the construction of a small work at Alia not far from Bassorah.

On the Greek frontier, in the Government of Janina, the construction of a series of defensible block-houses was commenced. These are distributed as follows:—2 on the Saranda road, 4 at Haimara, 4 at Delonia, 2 at Psilates, 1 at Metzovo, and 1 at Milo, near Metzovo.

Training of the Troops.—The artillery is instructed by means of the German Field Artillery Regulations. A portion of the Guard infantry are trained in accordance with the German Regulations introduced by the German Military Mission; but the rest of the infantry and all the cavalry are instructed by means of translations dating back to 1875.

There is no such thing as a regular systematic instruction in shooting exercises in the field, nor are there regular inspections or manœuvres (the 39th Division only, stationed in Tripoli, was reported to have held manœuvres in February last on the Ainzara plains). The instruction of the Turkish soldiers of all arms stationed in Constantinople is limited to what can be learnt on the small drill grounds situated near the barracks. In the other Army Corps districts some rifle practice (in 1890 in the 3rd Corps only, and not more than 3 rounds; in 1891 in a few garrisons equally with a very small number of rounds); here and there also artillery practice.

Cavalry.—As regards the raising of Kurdish mounted regiments, which has been spoken of for the purpose of completing the Turkish cavalry, account cannot be taken of them for the reinforcement of the 195 squadrons of the Regular cavalry. The above—and they are insufficient for the purpose—can alone be counted on for furnishing the divisional cavalry and forming a cavalry division. As cavalry of a second order, the Kurds, who may in some degree be likened to the Cossacks, will be able to do good service in their own country, that is, in the sphere of operations in Central Asia. From the registers made in the 4th Army Corps district of the Kurdish tribes in the vicinity of Van, Bitlis, and Musch, material is as yet available for 64 regiments, each 500 to 600 strong.

But there are only 6 regiments actually formed and mounted, and

28 more have half the number of horses required, and will be completed in the spring. The organization of Arab horsemen—planned at the same time as that of the Kurdish cavalry—from the nomad tribes in the vilajet of Mamuret-ul-Aziz and in other parts has not yet been carried out; but in this vilajet alone material sufficient to form 3 regiments have already reported.

Artillery.—The scheme for the reorganization of the field artillery, referred to in the Reports for 1890, is being carried into effect. Previously each of the first 6 Army Corps had had 2 regiments of from 12 to 17 batteries. There was besides in the Guard Corps a model regiment with 14 batteries. By the new organization each of the first 6 Army Corps is to have 6 regiments of 2 divisions, each of 3 batteries with 6 guns (1 mountain battery per regiment), and there will be also a division of horse artillery of 3 batteries for the cavalry division.

This would necessitate the formation of 10 new batteries per corps, together 60 batteries. But the model regiment is to be broken up; so the number to be raised is reduced to 46.

The new distribution was commenced in the 1st, 2nd, 3rd, and 4th Corps at the end of October, and is completed in the 3rd Corps. In the 1st (Guard) Corps it is also completed, except that the 6th Regiment has not received its horses, and the 5th Regiment has only its horses for the mountain battery. The new regiments of the 2nd Corps still require almost the whole of their horses. In the 4th Corps the new 3rd and 4th Regiments are complete; of the 5th and 6th Regiments, only the mountain batteries have been as yet formed. In the 5th and 6th Corps (Damascus and Bagdad) nothing has been done.

In all, there are still 39 guns required to complete the new organization and a large portion of the horses; the ammunition wagons are also wanting.

The redistribution of the recruiting districts and the increase to the field artillery are both important reforms. There remains to be dealt with:—

i. The revision of the corps of Officers of a sufficiently thorough nature to ensure the removal of all those Officers who through age or unfitness are not equal to the command of troops in the field.

ii. The introduction of a regulated and efficient method of training the troops for service, and especially the instruction of the infantry in rifle practice.

iii. The armaments of Erzeroum and Adrianople and the proper protection of Constantinople.

The political conditions on the old European theatre of war are more unfavourable for the Northern enemy than formerly. The Asiatic theatre of war can now, as formerly, only play a secondary rôle. It appears, therefore, certainly possible that Russia may in future attack directly, by the shortest route, the object for centuries of her desires and endeavours, and attempt to overwhelm Constantinople by a landing. The chances of the success of such an undertaking have been discussed elsewhere, and here it need only be

remarked that this Cossack *coup* can be effected without difficulty, if Turkey will not at the last hour take corresponding precautionary measures.

Infantry Tactics.

General Considerations.—The surprisingly powerful impression called forth by the introduction of smokeless powder and the small-bore magazine rifle has gradually given way to a quieter examination. We have become accustomed to examine in cold blood the enormous revolution in the matter of tactics which came about so suddenly, and to look fearlessly and resolutely to the future. The year 1891 has passed in peace, and the solution of the pending question by means of practical experience on the battlefield is reserved, therefore, as before, for the future.

The central point round which all questions of infantry tactics revolve is, naturally, the accomplishment of the infantry attack. And in this strong contradictions present themselves. It is acknowledged on all sides that no attack has any prospect of success unless an unquestioned superiority of fire has been previously obtained. But in almost all the armies of the greater European Powers, the principle is accentuated, that it appears imperative in the attack to advance quite close to the enemy, so far as this is possible, without stopping. How, notwithstanding, to obtain superiority of fire over the defenders, occupies the active minds of the infantry Officers of all European armies. Manifold proposals have been made on the subject; but none of them has hitherto proved entirely successful.

The simplest way appears to us to be to develop to the highest possible degree the power of the artillery. Here unconditional superiority over the enemy is the indispensable condition of success, and this is not simply a superiority in the number of guns, but rather superiority in the accuracy of fire, the readiness to fire, and mobility, combined with superiority in the effect of projectiles.

In a future war we expect to see the artillery play a still more decisive rôle than it did in 1870–71; provided the German artillery is then able to take the first place, our infantry attacks will also succeed.

We believe further that in this matter also, as is so often the case in life, green experience will gain a victory over grey theory. Attacks such as that on St. Privat will prove the rarest exceptions. The ground will far more frequently offer material advantages to the attackers, and it will then only be a question of utilizing these advantages as skilfully as possible. We are inclined to think that the constantly unaltered appearance of the beloved drill ground may have led many earnest and thoughtful Officers to perceive difficulties which will in reality seldom exist. But if a field of attack should be encountered that extends over ground similar to that at St. Privat, that is, over a glacis-like rising, completely unprotected slope without any cover, why then a decision will have to be sought at another spot that is more favourable. Attacks such as that at St. Privat will

in future only be possible when the attackers' artillery has completely smashed up that of the defenders, and has afterwards been directed for hours on their infantry, so that if not by means of the dreadful losses suffered, still by being thoroughly shaken, their moral power shall have been destroyed or materially weakened.

No one can now think that the decision at St. Privat should have been undertaken in a manner even approaching to that which unfortunately was actually adopted. Great mistakes were indeed made on the 18th August, 1870.

On other portions of the battlefield as well, the attackers were in a position to have secured a victorious decision of the battle. Anyone who wishes to be thoroughly instructed on the matter should read the latest book by Fritz König, on the Battle of Gravelotte.

The dispute about the "normal attack" goes hand in hand with the execution of the infantry attack. Lately, three of our most noted military writers have expressed themselves on the subject of the "normal attack."

General Bronsart v. Schellendorff, since deceased unfortunately, has, in a very clever paper, attempted to prove that in Germany our regulation instructions are all we require. General z.D. v. Scherff, equally in an important paper, has dwelt on the necessity for certain binding directions for the attack of infantry; that is, he favours in principle the "normal attack." And lastly, Lieutenant-General z.D. v. Boguslawski has expressed it as his opinion that a "normal attack" is only necessary for fighting in open ground.

It stands to reason that the publications of three such experienced and distinguished Generals have called forth a flood of discussion. In spite of everything, we have not got much nearer to the matter; and nothing has been contributed towards it abroad.

In view of the divergency of such acknowledged authorities, might not a simple instruction meet the case, such as "attack over an open plain, that does not offer the least cover, will, in future, be only undertaken if the Officer conducting it is firmly convinced that the enemy has been thoroughly shaken and discouraged; the Officer Commanding will answer with his head that deceptions such as that at St. Privat are avoided in future"?

The daily repeated and almost uniform appearance of the drill ground bears wonderful fruit. How often, then, do we work in large bodies in the field? How seldom do we find in the field a plain without cover?

The impossible remains impossible. Whatever may be devised, however clear a "normal attack" or none at all, on the naked plain without cover, every assailant will be shattered if the defenders are still in a condition to shoot and aim their fire. It is rather indifferent whether the attackers attempt to advance by one movement without halting to within 500 m. of the enemy or still nearer, or to take up a succession of "firing positions" one after the other before they occupy the "main firing position." On either supposition, the losses will be overpoweringly great, for the defenders, lying covered, offer only half-head targets, whereas the attackers, in their complete

absence of cover (as is supposed), offer alternative whole-figure targets advancing and whole-figure targets lying down. To this may be added that the defenders will generally know the correct distances. The chances, therefore, of hits on the part of the defenders are increased immensely, whereas the attackers have as good as no hopes of making hits. If any one should doubt the justice of this assertion, we would recommend him to observe the results as regards hits of the firing of a body of troops specially trained to rifle practice, such as the infantry school of musketry for instance, when the practice is at half-head targets at distances over 500 m.

If the Russians and French believe they can obviate these difficulties by the dash of their attacks, so much the better for us. We will leave to them the practical application of the doctrines of a Dragomiroff, for whom the experiences of Plevna simply appear to be non-existent. But the Germans will do well only to attack seriously and seek a decision where the ground offers the possibility of a complete result from the attack. Should, however, the German artillery succeed in shaking the enemy in the degree referred to above, the infantry may then be able to act successfully in less favourable ground. In any case we need not rack our brains over the question "normal attack or not?"

We are prepared for a storm of indignation from those who hope to enforce the attack over open ground, destitute of cover, by subtleties in peace, because we simply deny the possibility of such an attack succeeding, unless the enemy has been almost completely shattered by the attacker's artillery previous to the assault. This will not, however, prevent us from expressing our conviction. We greatly admire the old German courage, but we have not the least taste for the modern "dash" of posterity.

Since the introduction of firearms we have been undergoing a continuous process of great progress, a process the end of which cannot be foreseen. From of old, knightly heroes have attempted to fight for the impossible; but they have always succumbed to the constraint imposed by the limit of human attainment. Hardly in any times have braver warriors fought on a battlefield than the French knights who fought at Pavia in 1525. These knights looked down with the greatest disdain imaginable on the despised arquebusiers of Charles V, and still they succumbed almost to the last man, notwithstanding the most knightly and heroic courage which they showed, not only by words, but also on the battlefield.

And to-day something is haunting many heads that calls to mind those French knights. May we avoid the necessity for another St. Privat to teach us what we are justified in expecting from infantry attacking over open ground destitute of cover, even when it is not packed as close together as the German infantry in 1891.

A further question that is occupying all armies is, in what manner the attack is to be supported by firing during its advance. A number of persons are in favour of the line of shooters, while pressing forward, maintaining on the move an uninterrupted fire. The French actually carried out attacks of this kind in 1870-71, at Wörth for

instance; they have, indeed, gained temporary advantages by them. Still, the value of this kind of fire, delivered while running forward, appears, at least, very doubtful. In no case do we believe that the difficulties offered by an attack over open ground devoid of cover could be surmounted by means of it.

And, lastly, the question of reconnoitring during the actual fight is being eagerly discussed in all armies. It centres itself upon whether or not mounted infantry patrols should be introduced. It is not within the scope of this report to give a judgment on all these questions; but we cannot refrain from remarking that before an engagement; indeed both before and after, reconnaissance will continue to be a matter for the cavalry. Where a cavalry patrol is unable to gain a knowledge of the enemy's position, a mounted infantry patrol is hardly likely to be more successful.

But during the actual course of the fight under the effective fire of the enemy, mounted men will only very exceptionally be able to ascertain anything, for the enemy's fire will prevent them doing so. But supposing it to be possible, we see no reason why the cavalry could not perform this duty just as well as mounted infantry patrols. If cavalry are wanting in a sufficient knowledge of the fighting conditions of infantry, the deficiency can be very easily supplied; it is only necessary to practise, as often as possible, fighting exercises with troops of all arms, as, happily, is already extensively done. This would, anyhow, be simpler and cheaper than to introduce mounted patrols for infantry. We cannot, either, altogether shake off the impression that the introduction of these mounted infantry men would resolve itself in practice oftener than is desirable into a kind of sport. Let us leave mounted sports to the Officers, and not extend them to the non-commissioned officers and men of the infantry.

Abroad, attempts have been made to utilize cyclists with the infantry for carrying reports. There might be advantages in this in connection with outpost duties; in the greater operations of war we do not anticipate they will be of much use.

Germany.—A very interesting essay in the "*Militär-Wochenblatt*" (No. 25, 1891) explains thoroughly the great inconveniences with which the tactical instruction of the infantry has to contend in Germany, and recommends a radical change of the system hitherto followed. Although we are unable to agree with all the writer's proposals, still we consider the essay so important that we propose to discuss it here pretty closely. The writer finds fault with the existing instruction in the following particulars:—

1st. During the whole year the training for war, as designed, is frequently disturbed and restricted, both as regards the leaders and the men.

2nd. The instructional personnel are often unfitted for their duties.

3rd. The time of year and the utilization of the country are not arranged with due regard to the new requirements, and, in consequence, the time allotted cannot be so completely and appropriately employed as could be desired.

The writer now proposes that recruits for the infantry and jägers should only be called up every two years, in doing which the Army Corps must alternate: that is, one half of the Army would receive its infantry recruits in the even, the other half in the uneven, years. The period of service would remain three years, the engagements of the non-commissioned officers would be always for two years, so that their termination would not be identical with that of the men. The period of instruction would extend over two years and be divided into the following portions:—

1st Section.—From the 1st October to the 1st February of the following year: Recruit instruction. Every Officer and non-commissioned officer to retain permanently the same men under his command. No replacement or transfer of Officers or non-commissioned officers to take place during the first year. At the end of January the inspection of the recruits to be held by the Battalion Commander.

2nd Section.—From the 1st February to the 31st March: The instruction in subdivisions. Inspection at the end of March by the regulated Field Officer.

3rd Section.—From the 1st April to the 31st July: Drill of the company, field duties, individual and field firing, swimming, gymnastics, fencing, and field pioneer duties. Inspection in each branch of duties by the Regimental Commander.

4th Section.—From the 1st August to the 30th September: Instruction in battalion and in regiment. Exercises of companies and battalions against one another, bivouacs, field firing. Small cavalry detachments to be attached for patrolling and reporting duties. The last 10 or 12 days' exercises to be in brigade, with about 2 squadrons and 2 batteries, if this can be arranged for.

In the first year no detachment or divisional manœuvres to be held; a 14 days' General Staff tour with Officers of the intendance attached, conducted by the Divisional Commander.

In September the one-year volunteers to go up for their examination for Reserve Officers; but during the whole year not to be employed as instructors.

5th Section.—From the 1st October until the 28th February of the following year: Repetition of the instruction in groups and in subdivisions. The Officers and non-commissioned officers not on the active list to take part in the instruction. The men to be thoroughly accustomed to be commanded by different Officers, in contradistinction to the first year. Formation in bodies at war strength.

6th Section.—From the 1st March to the 31st July: Continuation of company exercises, field duties, applied gymnastics, bayonet fighting, swimming, principal firing period.

7th Section.—From the 1st August to the 30th September: Embodiment of Reservists and Landwehr men. Formation of battalions at war strength. Manœuvres up to the Army Corps, two Army Corps opposed. As far as possible all the Officers not serving actively to occupy the places they would hold in war.

Employment of Jägers.—The “*Militär-Wochenblatt*” (Nos. 63—

65) has an interesting article on the employment of the jäger troops in war. The writer draws attention to the advantages possessed by these troops in being recruited from a class of men who have already on joining important qualifications, such as medium height, powerful physique, good sight, good education, and for the greater part facility in the use of a rifle. He dwells also on the excellent instruction given them for employment in the field and in shooting, and comes to the conclusion that the jägers are superior to the infantry in fighting value and handiness. The writer would consequently employ them in the following manner:—

1st. To protect the mobilization and concentration.

2nd. During the advance against the enemy, the battalions of all the Army Corps marching on one road, from two to three battalions would act as a support to the cavalry division in front, open out narrow places, and protect its rear.

3rd. In the actual battle they would act:—

- i. As a reserve for pursuit or for covering the retreat.
- ii. In front of the artillery line for its protection.
- iii. In wooded ground.
- iv. To support the infantry attack, either from a flank or by firing over their own infantry if the ground admits of this.

4th. With the rear guard.

5th. In fortress warfare.

6th. In minor operations.

In these proposals there is much worth taking to heart, the employment of the jägers to protect the area of concentration during the mobilization seems to us especially very appropriate. The Russians, it is known, expect great things from inundating an enemy's territory at the commencement of a war with their masses of cavalry. It appears to us the proved dexterity of our jägers in shooting would be well adapted to place a limit to Muscovite arrogance. The second point equally is well worthy to form the basis of technical discussion.

Pioneer Regulations.—The new edition of the Field Pioneer Instructions of 1890 is worthy of joining the new Drill Regulations and the Musketry Instructions, and are excellent. They lay stress on the point that the ground must always be regarded, and only the natural cover need be strengthened; the form is only an accessory. The parapet should not be raised higher than is absolutely required to allow of overlooking the ground in front; the firer must get up as close as he can to the cover.

The absence of smoke from the powder, the enormous increase in the flatness of the trajectory as well as the greatly increased penetration of the bullet have led to a complete revolution in the matter of field fortifications. Even at great distances, the angles of incidence are very small compared with formerly; the value of artificial cover has consequently come into greater prominence. The increased penetration of the bullet necessitates a material strengthening of the covering parapet. But if this be sufficiently strong, the defenders

have little to fear from the infantry fire of their opponents; it is only the shrapnel fire of the artillery that threatens them with destruction. In view of the greatly increased effects of shell-fire, villages, hamlets, and walls have all lost more or less their value as cover. Still more than formerly earth-works form consequently the only effective shelter.

Inclosure walls, which in Germany are mostly of moderate thickness, are now pierced by infantry fire, when several bullets hit the same spot. This is especially the case with brick walls, and it is, therefore, necessary to provide a thick backing of earth. It is best to cut such walls down to the height that will enable men to fire over them; openings to fire through are not desirable; it is better to make use of banquettes. But regard should be had to the fact that the higher the object is placed, the more destructive will be the effect on it of artillery fire.

Earthen parapets are, therefore, always the best, against infantry fire a thickness of 1 m. will suffice; they should be kept low, and for choice excavated in the ground. Obstacles are only of value when the attackers can be seriously checked at a distance of from 250 to 400 m. from the defenders, exposed to the hottest fire. No closed intrenchments; a couple of well aimed shrapnel will destroy the occupants.

The construction of several lines of earth-works one behind the other; the 1st line completely cut in the natural ground; the 2nd, 50 to 100 m. behind it, half excavated and half built up; the 3rd, in the form of a parapet, again from 50 to 100 m. behind the 2nd.

Woods are of value for defence only when cover can be constructed 20 to 30 m. in front of them. Hamlets are altogether unsuitable.

For the attackers, ridges, undulations of ground, railway or canal embankments, and hollow roads have an increased value.

Musketry Instruction.—The training of the troops to fire under service conditions is coming more and more prominently forward. The most important consideration is for the firing to be carried out as it would be in the decisive phases of a fight. In Germany a sufficient value is given to individual firing under service conditions; but this is not so much the case as regards firing in bodies. The influence of the Company Commander must be more assured than is now the case, when frequently the field firing is conducted by the Battalion Commander, and even bodies at war strength are formed for the purpose.

Too high a value should not be placed on the guidance of the fire, for in reality it can only be done in a limited degree. We have taken a step backwards in this respect since Metz. At first it was wished, if possible, to entrust the Battalion Commander with the conduct of the fire, then to the Company Commander; later we were inclined to think that the subdivision leader was the individual who could most appropriately guide the fire; now the perception is constantly gaining ground that probably the subdivision leader even will not always be in a position to exercise the desired influence on

the conduct of the fire, and that the individual action of the men themselves is rather the end to be aimed at.

Consequently judging distances will be of increased importance, and this from the lying-down position, for in action firing will take place almost exclusively lying down. Not only the Officers, but also the non-commissioned officers, should, therefore, be provided with field glasses, and practised in the proper use of them, with special reference to judging distances.

It is of great importance that in field firing targets corresponding to service conditions should be used, regardless of favourable scoring results; therefore head, or even half-head, targets should be employed at ranges of from 500 to 800 m., for on the offensive it is at these distances that a decision as to the superiority of fire will be arrived at.

With regard to the question of long-range fire, the opinion seems to incline towards it for the defenders, and to short-range fire for the attackers. If the objects to be aimed at in either case be kept in view, and results of firing at these objects in peace be considered, we are prepared to assent to this opinion.

France.—The “Spectateur Militaire” returns to its favourite idea of portable shields. They would be 2 m. high, 1 m. broad, and constructed of two steel plates 3 mm. thick with a space of 5 cm. between them; weight 30 to 40 kilos. They would be carried in front of the assaulting columns by strong men. An Army Corps would have 500 of these shields, which would be transported on wagons. They would be erected 300 m. from the enemy’s position. We will give our opinion on this very briefly. It is this: that we shall be delighted to see these shields employed by our enemies. Experience with them in the field would soon afford ample enlightenment regarding their practical applicability.

The chief interest centres about the extensive autumn manœuvres which, in 1891, were carried out on a more extensive scale than had previously been witnessed in France. Four Army Corps (Nos. 5, 6, 7, and 8), a brigade of marines with 3 marine batteries, a provisional rifle battalion, and 2 independent cavalry divisions took part in them; in all 114 battalions, 80 squadrons, 89 batteries.

General Saussier issued the following directions for the manœuvres: “The troops of the 1st and 2nd lines, which would be weakened by their losses and shaken by the previous course of the action, will not be able generally to carry it through to the assault; this is therefore left for the 3rd line, composed of the reserves, that will have been brought as close up as possible by utilizing the cover available. The formations for it will be either company columns with sufficient intervals but with a single objective, or battalion columns in *échelon*, or open double columns, &c. The assault must never be undertaken from too great a distance, and it must be carried out without firing, only a steady advance. Other troops must prepare the assault by means of rapid firing.”

We think we shall best serve the reader if we reproduce several

criticisms on these manœuvres, emanating principally from French pens, from which everybody can draw his own conclusions.

1st Criticism.—The manœuvres led to improbable representations, because it was known beforehand who was to win. The defence remained inactive in positions without depth; the defenders often played only the rôle of targets, who only had to succumb and must not attempt to evade being defeated. Attacks often took place without regard to the enemy or the ground; an endeavour was always made to attack in flank without engaging the front; hence weak and disconnected attacks everywhere; impossible assaults without coherence, without judgment, and, in spite of this, successful at the onset. By no means sufficient attention was paid to infantry fire.

In France even the Officers are not sufficiently instructed regarding the trajectories of the rifle bullet, and the principles resulting from this. It is not the fault of the Officers, but of the higher control that does not raise the Officers to the proper standard.

2nd Criticism.—The marching performances of the infantry at the manœuvres were good. The fire-discipline was excellent; the Officers proved themselves most skilful; but pressure to go forward was still observable in an abnormal degree. Attacks took place without regard for the effect of the enemy's fire, without the attackers utilizing their own fire. Especially in the 7th Army Corps the shooting line was formed in one rank in spite of the thickening that had taken place as the position was approached. The front of the battalions was too extended, and there was confusion in deploying. In this respect more quiet is to be observed.

3rd Criticism.—The deployment in fighting formation and the march across country took place too early, before the troops had come into contact with the enemy. The assault was not always thoroughly prepared; the ground was not sufficiently utilized. The word was always Advance! without strength in the front. Impossible assaults without cohesion. The different tactical instruction in all the Army Corps is regretted; each General Commanding a corps has his own principles—one prefers the long thin lines, another the column tactics, while a third adheres to the regulation pattern. This cannot be otherwise under a War Minister who understands nothing about the training of troops for war; a uniform instruction was wanting; the French Army has only an army, but no head.

The "Spectateur Militaire" of October, 1891, contains a detailed account of the manœuvres.

An interesting publication of 1891 was "Quelques indications pour le Combat," by General Ferron. He prescribes 400 m. as the limit of extension of front of a battalion in the attack, and 500 m. as its depth. But for the defence he would allow the front to be increased to 500 or 600 m. In this he is at issue with the German regulations, by which the front of the battalion is restricted both in the attack and on the defence to 400 m. For fighting on the defensive in large bodies, such as an Army Corps, General Ferron's system offers evident advantages; an Army Corps, by reason of the weaker occupation of its shooting line, can hold ready proportionally

stronger forces for the counter-attack; and the counter-attack is the main point. For the larger bodies General Ferron recommends for the attack the employment side by side of regiments or brigades, whereas, on the defensive, he regards their formation in lines one behind the other as preferable under certain conditions. He does not think that frontal attack offers much prospect of success, even when prepared by artillery fire.

Space does not permit of going further into General Ferron's views, beyond giving a brief extract concerning the decisive attack of an infantry division; but attention is called to the excellent articles on the subject in Nos. 4 and 5 of the "Militär-Wochenblatt" for 1892. He says: "The object of the infantry fight is to obtain the superiority of fire in a position situated at a distance from the enemy of 800 to 400 m. Deep formations must now be avoided, the front sufficiently extended, and resort had, above all, to outflanking manœuvres. All the arrangements must be made for the men to be amply supplied with ammunition. The turned flank of the enemy must succumb to a hail of bullets and projectiles.

"The deployment of the shooting line belonging to the battalions in first line takes place, if in view of the enemy, at about 2,000 m. distance from them; when the supports enter this zone they also form like the shooting line. The companies that are kept back follow the shooting line at from 400 to 500 m. All make use of the shelter available to take breath. Volley firing can be begun at 1,200 to 1,500 m., provided the object to be fired at offers a good target; but the forward movement must be continued until a favourable firing position is reached, distant 800 to 400 m. from the enemy. In this position the firing line will be reinforced by the supports, and extended by the reserve companies. The fire must be intensified to the greatest possible degree.

"At this stage it is not a question of avoiding losses, but rather of inflicting them on the enemy. A large quantity of shots must be fired, so as to gain in all circumstances a superiority of fire, and thus make a continuation of the advance possible. Of two opposing lines of infantry victory will rest with that one in which the men can handle their arms the most skilfully and have the most cartridges.

"If the enemy is kept under by the converging fire of frontal and flank attack, the assault will be undertaken, but not by the shooting line. The latter will be too much exhausted and too much weakened by the enemy's fire to be able to cross the distance of approximately 600 m. that separates it from the enemy, and overthrow them. The assault must be carried out by fresh troops, not yet weakened by having been engaged, and in close order. The firing line of the neighbouring battalions join these troops.

"As soon as the leading companies come up with the shooting line these advance with them and fill up the space between the individual battalions. The entire mass then advances 200 m., takes breath, and endeavours to overcome by its fire the last resistance of the enemy. After a few minutes the battalions rise up, the companies in rear

take the place of the most advanced ones that have been disordered by the fire, and advance again until the enemy's position is gained."

The care which France is taking to be prepared for a great war is evidenced, amongst other measures, by the exercising of troops for the protection of the railways. It is the troops of the Territorial Army that are to watch the lines during mobilization.

Russia.—In the new musketry regulations figure targets only are recognized. The men shoot only in formation as a firing line, and firing takes place up to 2,200 m. The targets are 1·78 m. high, and a number of figures, body, or head targets can be pasted on them. Excepting for recruits, there is generally no firing under 200 paces; individual firing is practised up to 800 paces, and volleys at longer ranges. Judging distance is diligently practised, and an endeavour made to instruct infantry to judge correctly up to 2,500 paces.

New instructions issued for the attack prescribe the deployment of the infantry employed into fighting formation at a distance of 1,400 to 2,100 m., according to circumstances. After the enemy has been thoroughly shaken by artillery fire, the infantry advances to within 550 to 700 m. of the enemy and then halts. The firing line has to look out for an appropriate firing position; the artillery accompanies the infantry to about 850 m. of the enemy, as far as possible on the flank of the troops for the assault. The shooting line is then advanced without any pause to 100 m. or 200 m. from the enemy. Here rapid fire is opened and then, when the reserves reach the shooting line, the assault is delivered.

A peculiarity of the Russian Army are the winter exercises carried out in Petersburg, Warsaw, and the Caucasus with and without ball ammunition. The experiments against intrenchments, constructed of loose and beaten snow, were of considerable interest. The penetration effected in loose snow was the following: at a distance of 600 m. it was from 1·2 to 1·3 m.; at 300 m. 1·2 to 1·4 m.; at 150 m., 1·5 to 1·75 m.; at 75 m., 2·3 to 2·4 m. In beaten snow the results were still more favourable.

In the Krasnoe Selo camp a number of night exercises took place in 1891, at which the value of the specially trained hunting detachments was clearly demonstrated. The troops accustomed themselves remarkably to the difficulties offered by a dark night and learned to reconnoitre the ground by night.

In Russia a special partiality exists for the so-called penetrating attacks. Their object is to accustom the infantry to the powerful impression of a large mass of cavalry sweeping down on them. At first the cavalry rides at a walk through the infantry lines so that the men may become accustomed to the appearance of the horses. An attack at full gallop follows equally through the middle of the infantry. Whether these exercises are really of use we will leave undecided. In the first place one might think that the intensity of the firing may be a useful exercise for the horses. The German infantry in 1870 exhibited no trace of uneasiness in face of the French cavalry attacks; in Germany, therefore, penetrating attacks would seem to be quite superfluous.

Switzerland.—The new drill book for the Swiss infantry is the expression of the general opinion regarding the present state of infantry tactics, only made to suit the peculiar conditions of Swiss military service. It is, therefore, worth while to consider these regulations more closely.

The company is divided into 4 subdivisions and into 2 "plotons;" every 4 files form a group. The firing is conducted by the company or the subdivision leader respectively, who must be provided with field glasses. There are not to be any volleys, only individual and magazine fire. Distances up to 500 m. are classed as "short;" from 500 to 1,000 m. are "medium;" from 1,000 to 2,000 m. "long."

To form the advanced shooting line entire subdivisions are always extended; battle patrols must never be forgotten. The remainder of the company follows as support in line, in open line of subdivisions, or in one rank. Column is only to be employed when complete cover is available. The reinforcement of the extended line is carried out either by prolonging or by strengthening it.

The company assembles either in column of "plotons" or of subdivisions. The normal formation of the battalion is either "plotons" column or line of columns, only exceptionally in subdivision column. In plotons column the companies stand in plotons column one behind the other; in line of columns they are in the same formation, side by side. The intervals and the distances are each 6 paces. The conversion from one formation into another is always to be executed by the shortest way. In fighting formation there is a shooting line and the battalion reserve; the latter follows at first at 400 m. distance, and subsequently according to circumstances.

It is the same with the regiment, which, as a rule, consists of 3 battalions; also with the brigade. The deployment of a regiment into fighting formation takes place with a small front and deep distribution. A battalion of direction is always to be given, and the general direction of the attack fixed. The rearward lines have at first a distance of from 300 to 500 m., but they depend afterwards entirely on the circumstances of the fighting and on the ground.

In the fight decisive importance is frankly attributed to fire, and extended order is indicated as almost exclusively the fighting formation. Whenever it is possible every fight is to be conducted by means of the offensive, for the attack alone leads to decisive results. A decided clear resolution is to be taken by the Officer in command, and is then to be executed with iron will. Irresolution is indicated as a gross fault; but inaction as punishable. Orders are to be simple and clear, and their execution is to be carefully watched. Under all circumstances the necessary scope is to be afforded to subordinates. The communication to them by the Commander of his own views before the fight is stated to be specially desirable. During the advance the Commander should always be in the front, so as to see for himself and receive reports early. During the engagement, on the contrary, he should remain with the reserve, because, once the fight has commenced, he can only exercise a decisive influence on its course by the proper employment of the reserve.

In the sphere of effective fire mounted Officers of infantry are to dismount even in peace. All the Officers also are to make use of cover in peace, so that the troops may be accustomed to seeing this done. This appears to us very important.

Few men should be deployed in the shooting line until a clear view is gained; then strong swarms of men should join it, so that a superiority of fire may be obtained as quickly as possible. The front is always to be kept small, so that the firing line may remain thick. A single company must never occupy a front exceeding 100 m.; care is to be taken to have a proper distribution in depth.

Closed bodies retained in rear are best placed in *échelon* behind a flank of the fighting line, that they may avoid useless losses. They should only be kept in column when under cover.

A brigade is to occupy a front of 1 km. Within 1,500 m. when exposed to effective fire the advance is to be in rank entire. Flank movements under fire are distinctly forbidden. In the attack a point to march on is to be selected as far off as possible. Up to about 600 m. the advance is to be in quick time, from thence by rushes.

At a greater distance than 1,000 m. fire is only to be conducted by bodies of at least the strength of a subdivision, and then only when there is a prospect of favourable results. The zone of greatest fire-effect begins at 500 m. Here, therefore, the principal firing position is to be taken up. But as a last act before breaking into the hostile position, a magazine firing position is to be taken up at fixed sight distance.

The regulations say that infantry fire first becomes superior to artillery at 1,000 m. Flanking fire is always to be preferred to frontal fire. Pauses are to be made in the firing, always at least with a subdivision front; the signal will be a long shrill whistle. The ammunition wagons follow their battalions into action up to within about 1,500 m. distance behind the centre of the brigade for the 1st relay, and 2,500 m. for the 2nd relay.

The unprotected wing has always to provide for the flank defence. The assault is only to take place when the enemy are shaken by artillery fire. A turning movement should be directed as nearly perpendicular as possible against the enemy's flank.

The impulse for the assault originates either with the shooting line or with the Commander, who sees everything, which is better. It is certain death to retire exposed to the enemy's fire. In the assault the advance is only to be continued sufficiently far to secure a free field of fire on the retiring enemy.

In the defence the chief point is a careful choice of position; great pains should be taken to strengthen the ground artificially. The occupation of advanced posts should as far as possible be avoided. A strong front of fire is of more importance. Its complete occupation, however, should not be carried out until the direction of the enemy's attack is known. The supports for the firing line must be placed as near to it as possible. The ground in front should be paced and the distances made known. The flanks are to be covered

by battle patrols. A main reserve is always to be set apart, for the counter-attack is the main point in the defence; but it must never be undertaken with the firing line.

Speaking generally, nothing but complete approbation is to be accorded to these principles of the Swiss drill regulations; they are in complete accord with the characteristics of the Swiss troops and with the conditions of tactics at the present time.

Literature.—The more important works of a tactical nature published during 1891 were the following:—

i. "Betrachtungen über eine zeitgemässe Fechtweise der Infanterie." Von Bronsart v. Schellendorff, Commandirende General. Berlin, 1891.

ii. "Reglementarische Studien." Von v. Scherff, General der Infanterie z.D. Berlin, 1891.

iii. "Die Nothwendigkeit der zweijährigen Dienstzeit." Von v. Boguslawski, General-Lieutenant, z.D. Berlin, 1891.

iv. "Quelques indications pour le Combat." Par le Général Ferron. Paris, 1891.

v. "Meldereiter bei der Fusstruppe." Von Regenspursky, Oberstlieutenant. Wien, 1891.

vi. "Mehr Feuer beim Angriff." Von K. v. K. Berlin, 1891.

Cavalry Tactics.

Opinions respecting smokeless powder have, at least in the circles to be regarded, declared themselves still more in the sense that it has not introduced a new era for cavalry. "I imagine that everything continues for us as of old, whether with or without smoke and noise," says Major v. Kleist, in his excellent pamphlet on Officers' patrols, the best, indeed, that has been written on this latter subject. As a logical consequence of the introduction of the new means of propulsion, it must be recognized that the chief characteristics are not the freedom from smoke and noise of the new powder, but rather the increased range, flat trajectory, and precision of the modern arm. As regards the performances of this, especially of the Lebel rifle, experiments at the Châlons School of Musketry have shown that 16 or 17 shots are required to place *hors de combat* a mounted man halted at 600 m. distance, a number of rounds that would have to be considerably increased if the horse were moving at a gallop.

From this it may be rightly concluded that the chances for the scout are still very favourable, leaving out of consideration the fact that it would be hardly necessary, especially if he were provided with glasses, to ride up so close and without cover. The French, though not those in cavalry circles, are wrong in their pessimist apprehensions. An instruction issued by the Technical Committee for the Infantry runs as follows: "In general the cavalry can ascertain only 'sommairement,' and not with precision, the position, strength, and dispositions of the enemy. The insufficiency of the cavalry must, therefore, be supplemented, 'en faisant appel aux autres armes.'"

In the directions for the last great manoeuvres there was an instruction in the same sense, to the effect that as soon as the enemy was approached the cavalry was to clear the front and be replaced by infantry groups, which would then take over the scouting duties.

The pamphlet referred to above continues as follows: "To banish cavalry from the battlefield because an improved rifle has been invented, is to view the events of the day as of supernatural size and not in the light of the century, then let us enter merrily into the age of smokeless wars! This time, again, the repast will not be so hot as is now cooking in some pots and perhaps, also, in some people's heads." In this reference, also, Major v. Kleist is completely justified. Every cavalry man will agree with him and none will be kept back by black prophets from doing his duty on the battlefield.

Cavalry will not ride at more or less intact infantry; that it has never done with success, but their opportunity will be where only a weak fire may be expected, as on the flanks, against battalions retiring physically or morally shattered, which have fired all their ammunition. The factors that influence their success, the bearing of the enemy's infantry and the degree of surprise with which the attack is made, lie outside the question of arms.

The well-known Russian General Suchotin expressed as his views that the difficulty at the present time in the employment of cavalry on the battlefield must not lead to their utility being altogether denied, but rather to these difficulties being overcome by means of better instruction. In earlier days the cavalry have profited by some of the conditions of modern war, especially the murderous fire that shakes the enemy's nerves and depresses their spirit. "The entire peace training of cavalry has one object only in view, in the moment of danger to sweep down like a hurricane on the enemy, especially on the most important portion of them, which is the infantry."

The well-known Austrian Colonel v. Walthoffen expresses himself in exactly the same sense. In the "International Review" he has published a very learned and exhaustive paper on the subject. He divides the modern battle into five phases. Already, in the first phase, the introductory, the careless advance of the enemy's advanced guard, or the too late retirement of their outposts, offer favourable opportunities to the cavalry for a sudden stroke. He does not consider it possible for the cavalry to come forward during the execution of the actual infantry engagement on account of the enormous power of the present rifle. It should, therefore, be withdrawn behind the flanks or centre. In the critical moment, when the attackers proceed to the actual attack, and the defence endeavours to meet them, the cavalry can be employed, though with care, to bring the enemy's attack to a stand and force them to suspend their action. At the decision, that is the assault, or on the defence—the action to repel it, all the forces must be called up, all the arms must co-operate. At the decisive moment one can never be strong enough; just as the last battalion and the last cartridge must be employed, so must also the last cavalry soldier and the last breath of his horse. As regards the pursuit, Scherff's saying is referred to: "Any one who has

seen infantry falling back from a real infantry decision, knows what a rich booty they will be, in spite of the breech-loader, to cavalry falling on them at the right time in masses, and riding them down with one heavy wave following shortly after the other."

Colonel v. Walthoffen lays down the following considerations for the success of a cavalry attack:—

1st. The most complete surprise possible, the ground and weather will often allow of it; the most favourable moment is when the attention of the enemy is distracted, so that they do not observe the approach until too late or not at all, and when the enemy's nerve is shaken, the moment of the Napoleonic "*événement*."

2nd. Against flanks and rear as the most sensitive points; here lies the decision, not only tactical but also strategical; defeat will mean a catastrophe.

3rd. The greatest possible energy and development of strength, formation in depth, attack on attack, which will not allow the enemy to regain his senses.

4th. Assembly of all the available forces, unity of leading, determined and energetic execution with a knowledge of the object to be attained. Every individual must be impressed with the irresistibility of his attack. Having regard to the result, even considerable losses must not be shunned. Seydlitz, at Zorndorf, lost in one hour 21 per cent. of his cavalry, 78 Officers, and 1,267 men out of a total strength of 7,000. Tactically his task was as hard as it could hardly be at the present time; for the Russian masses stood 12 ranks deep, and the artillery and infantry fire were quite enormous. Colonel v. Walthoffen, moreover, estimates the number of hits during an attack in the present time very low, indeed too low. He believes that cavalry, up to within 600 m., offer a very bad target owing to the rapidity of their movement and the difficulty experienced by their opponents in arranging their sights. But the last 500 m. would be traversed in less than one minute; more than 1 per cent. of hits should not be expected with normal conditions. The considerations conclude with the words: "Now, as in the time of Seydlitz, and always, if only in sufficient strength, and set in motion in a favourable direction at the proper time, with a definite object, and regardless of consequences, cavalry will certainly break upon the surprised enemy like a destructive tidal wave, sweeping everything away that does not get out of the way of its destroying path."

One principal condition stands out from all these considerations: retention of the cavalry in masses, no dispersion and isolated enterprises of weak bodies, as so often was seen in the 1870–71 campaign. With these mass tactics, if we dare say so, the question of cavalry corps again comes to the front. The Russian great manœuvres of 1890 have brought the question forward again, and the for and against each endeavours to prevail.

The considerations against the cavalry corps are that it only brings to bear the individuality of one leader, and that the supply of such large masses at one spot is impossible. Its extent of front is too small, the covering of the broad front of modern armies demands

expansion in different directions and contact with the enemy at the greatest possible number of points. Reports from one point seldom serve to make the situation clear. Further, the Commander of a cavalry corps to whom the divisions on the several roads are subordinated is an unnecessary intermediary, through whom the reports have to be sent out of the way and would come too late; also the Commander cannot possibly overlook the whole of front, and will frequently, therefore, not be with the main body at the spot where its presence is required. The distance from the centre to the flanks, and *vice versâ*, is too great to permit of mutual support. It is not possible to direct on one point, by surprise, 60 or 70 squadrons; the rapidity, mobility, and elasticity, the chief power of cavalry, will be lost. In peace exercises, lastly, this massing of cavalry tends to the neglect of the training in mixed bodies and the working in co-operation of the three arms. It is therefore desirable that the independent divisions should continue to be the unit both for operations and for battle, under the direction of, and immediately subordinated to, the chief Commander. The "Jahrbücher für Deutsche Armee und Marine" instance in support of their opposition to cavalry corps the Napoleonic campaigns, especially those of 1805 and 1806, and seek to show that, though so often successful, the reconnoitring was insufficient. In December, 1806, the incomplete intelligence gained by the closely concentrated cavalry corps commanded by Bessières would have made impossible a decision that would at first have been possible at Pultusk.

We might, on the other hand, recall the great results effected by Napoleon's cavalry corps. For the strategic reconnoitring, however, it appears preferable to adhere to the division as the unit, and not begin by assembling all the available cavalry divisions in corps. Indeed the numerical strength, or rather weakness, would make this course imperative. Germany, for example, after deducting 20 brigades (40 regiments) for her 20 Army Corps, would only have 52 regiments left from which to form corps. Instead of 3 or 4 of these, the formation of 8 or 9 independent divisions, 2 or 3 for each Army, would be more practical. It by no means excludes the employment of cavalry corps. During the operations many situations can be imagined in the different stages of a campaign in which the assembly of several divisions under one command would offer the means of carrying out special definite tasks. And for the battle this must be the rule; for years it has been ordered both by the Austrian and German regulations.

To be in principle against cavalry corps appears to us to be as little right as to form such bodies always and permanently. The military situation should alone decide their formation. Napoleon followed this principle. He always acted according to circumstances, and he never formed cavalry corps only or formed them permanently. Their strength was very varied, often hardly greater than that of German cavalry divisions. The difficulties in moving, leading, and quartering cavalry corps should not be reasons against them: how to overcome these difficulties must be learnt by sufficient practice.

Cavalry Manœuvres.—Some interesting exercises took place in Russia, especially in the Warsaw district and in the Vladikavkas camp. General Gourko, Commanding at Warsaw, was present at an exercise carried out by the 1st and 14th brigades formed in a division against a marked enemy, representing at first cavalry and afterwards a rear-guard of all arms, and also at an exercise of the 6th and 13th Cavalry Divisions, and the 3rd Brigade, 2nd Guards Cavalry Division, formed as a cavalry corps against a supposed enemy retreating.

Gourko, on this occasion, dwelt on the importance of practising the marked enemy from time to time. The best Officers must lead its squadrons; much more instruction is gained thus than by riding before the subdivision. The more skilful and independent the marked enemy, the more instruction will be derived from the exercise. There will then be no grounds for fearing the most skilful enemy.

At the Vladikavkas camp a force of 7 battalions and 23 squadrons (the cavalry in the middle, 6 battalions to the right and 1 battalion to the left) attacked a large battery of 36 guns, supposed to form the centre of an enemy's position, and having a regiment of infantry on either flank. The moment chosen was after the enemy's artillery had been firing for some hours, and the infantry had come up into the firing line in its support. The cavalry attacked the batteries in front, the 7 battalions were directed on the infantry opposed to them, so as to draw off their fire from the cavalry. The latter started at a distance of 5,000 m. from the guns; during the advance both pace and formation were frequently changed, so as to hinder the fire of the guns from taking effect; the attack was executed at all the paces up to the shock; the charge was carried out by means of half-squadrons extended in swarms, followed by the closed bodies. The former surrounded the guns on all sides, the latter passed through the intervals, and fell on the escort and then the infantry. The attack was executed, in spite of the hottest fire, with quietness and energy.

The observations made by the director of the French Cavalry Manœuvres held at Châlons were published in the December number (1891) of the "*Revue de Cavallerie*." The following are amongst the more important points adverted to:—In the exercises of one regiment against another, the reports of the advanced guard were generally waited for, which is wrong. The advance should be made, the reports are then received quicker, and the possibility of effecting a surprise is greater. The object of the advanced guard is not to obtain intelligence from a distance in front, but rather to secure the main body from surprise.

When the enemy were encountered it often happened that single squadrons were detached to operate against a small portion of the enemy, and resulted in a want of unity in the fight; portions of the enemy that separate themselves from the main body are of secondary account; the important point is to overthrow the main body. The flank squadrons did not always carry out their rôle satisfactorily; there were often large intervals between them and the flank of the principal line that had to be protected, so that the enemy could have pushed through and got round the flank in spite of them. The retention of reserves

was not always observed, or when it was they entered the fight at the same time as the principal attacking line.

In the exercises of brigade against brigade it was observed that the leaders often clung closely to their troops, and consequently lost view of what was passing. A whole brigade of three regiments engaged in this way three squadrons. It was no excuse that this was due to want of intelligence; no leader ought to engage without having seen with his own eyes. The artillery escort has not always fulfilled its duty; it must reconnoitre the ground about the batteries, and thus protect them from surprise. The assembly after the *mêlée* is best in rear with the reserve not on the actual ground. It took place frequently in column; by regulation it should be in line.

All Officers' patrols ought to receive their instructions personally from the Divisional Commander. The subdivisions sent forward to reconnoitre should not be altogether extended, as is often done, but they should be kept in close order, and only small patrols consisting of two or three men sent out from them. The strength of advanced guards differs very much; it may be quite right one time to send a whole brigade, and at another two squadrons will suffice. Battle patrols only report verbally, they have not time to furnish written reports. Attacks upon batteries should generally be made on a flank: they were frequently frontal when a flank attack was possible. On one occasion the reserve had been drawn into the fight, and had taken its place on the extreme left flank, when actually required on the right. It must be kept far from the fight, and so placed as to be prepared for all eventualities.

Use of the Carbine by Cavalry.—From time to time, but without gaining in influence, the view is advanced that the employment of cavalry dismounted, and of the fire power of the carbine should be extended. The most advanced ideas on the subject lately published are contained in "*Unsere Cavallerie*" (Hanover, 1891, Hellwing). "As in a battle, so also in the fight of a cavalry division, every gun, every carbine, and every rider must be made the most of," and, further, "We must place a greater value on the utilization of the fire power of our cavalry divisions, and it is more natural and corresponds better with the perfection of our modern fire-arms to shoot an enemy than to ride him down or run him through." These are the views of the author, and to give effect to them he would form the whole of the cavalry in rank entire. The advantages he claims for this formation are that it allows of more rapid deployment, because in the attack the rear rank is not brought to bear, because it facilitates more extensive distribution from front to rear, and, lastly, because only by means of it is it possible to dismount quickly and maintain a continuous fire action.

Captain Choppin, of the French Army, pronounces himself against such theories in the following words, which are very much to the point: "Everything that can be done mounted must be done mounted." In other armies the same view is taken, and lately an instruction has been issued by the Russian Inspector-General, directing that the practice of fighting on foot is only to be resorted to in

those cases in which it would really be used in war, and a warning is given against its excessive employment. Fighting dismounted is and will continue to be a makeshift.

All true cavalymen must be strongly interested in the question of firing mounted, that has lately been hotly discussed in Russia, which is the more strange from the author being General Suchotin, a generally acknowledged cavalry authority. He speaks of the undoubted guarantees for this kind of fighting from the Napoleonic wars and the American War of Secession, and notices the fact that in the Russo-Turkish War of 1877-78, a lancer regiment fired 40,000 rounds mounted; with what result is not stated. He considers, too, that now the conditions are more favourable for it than they were formerly, when fire could only be used at distances that could be covered in a few strides at the gallop, and was consequently ineffective. The man shooting from horseback has further an advantage over the infantry soldier on account of his greater elevation and consequent extended field of view.

But it is not against infantry but against the enemy's cavalry that he looks for its employment by a weaker force or against an enemy who withdraws from fighting in the open into broken, marshy, or wooded ground. Three or four volleys would be delivered at distances from 1,800 to 400 m., and at the last moment the cavalry will be launched with drawn swords on the enemy. Firing at the enemy in front and changing on his flank, and *vice versa*, are specially recommended. Systematic training will lead to the cavalry shooting as well from horseback as the infantry shoot. The author of "Unsere Cavallerie," already referred to, accepts this manner of fighting as already adopted by the Russian cavalry, and thinks it very likely that in a future campaign we shall find Russian squadrons advance at the trot, halt at 500 m., fire a volley, and then straightway charge at the gallop with fixed swords. He is further an enthusiastic adherent for this mode of combat; but if he expects great results from the volleys fired, the Russian cavalry have already proved the contrary. Half a sotnia of Daghestan Cossacks (men accustomed to horses and rifles from their youth), after firing some volleys with blank at the camp of Torni-Chan-Schura, delivered two volleys with ball at targets situated at 800 m. and 600 m. distance. The result was four hits to 60 rounds, and none to 52 rounds respectively.

Corps or Divisional Cavalry.—The comparatively weak strength of the cavalry and the constant and proper endeavour to mass it have contributed greatly to the value of corps or divisional cavalry being underrated. The reports of the Russian and French manœuvres contain frequent complaints of this. It has been imagined that, in the present age of the employment of enormous masses in war, divisions and corps would play a secondary rôle, and that single Army Corps would no longer march against an enemy, but only armies of five or six corps; consequently, the cavalry should be taken from the Corps Commander and placed together under the orders of the General in chief command. In the endeavour to form the greatest possible number of cavalry divisions, it is often deemed sufficient to

provide the infantry with a few orderlies, as far as possible mounted on horses called up on mobilization.

Russia, for example, has formed almost her whole cavalry into independent cavalry divisions (twenty). Only twenty-four sotnias are available as corps cavalry, which, in the course of mobilization, would be strengthened by the Cossacks of the 1st and 2nd levies. But the latter could hardly be depended on at the commencement of operations. But such views are a misappreciation of the actual conditions. Undoubtedly both species, the cavalry divisions and the corps cavalry, have their full justification. The operations and strategic measures to be adopted will depend on the reports of the former, the tactical measures on those of the latter. The war of 1870-71 offers a number of examples of the divisional cavalry making important reports which had not been sent in by the cavalry divisions. A number of corps belonging to an army never march close together, but on different roads, often separated some distance from one another, in an enemy's country, perhaps in a country the inhabitants of which have risen. The connection of these columns with one another can only be maintained intact by means of cavalry. The cavalry divisions are often more than a day's march in advance and are not in a position to undertake the indispensable duties of immediate security. The German "Felddienst-Ordnung" says: "Cavalry divisions or portions of them in front of the army are, having regard to their special tasks, not generally in a position to cover immediately the portions of the army that are following. These must, therefore, even if they have cavalry divisions in front of them, always tell off an advanced guard. It is the duty of this latter to obtain and keep up communication with the advanced cavalry divisions, by means of its cavalry."

And, lastly, without cavalry the corps ceases to be a strategic unit; in the absence of direct reports the Commander cannot possibly have the time to make his decisions and dispositions. Napoleon always had his cavalry divided into two parts, independent divisions or corps, and the regiments attached to the individual infantry corps; the strength of the latter was not fixed and unchangeable, but it depended on the strength of the corps—which differed considerably—the service to be performed by it, and its greater or less independence. In the 1805 campaign, for instance, there were 112 squadrons assembled in cavalry divisions and 93 squadrons distributed between the 7 separate corps (7 to 16 squadrons per corps). In 1806 the proportion was 114 and 61; in 1809 it was 97 and 37 (7 to 18 per corps). The corps on the flanks were made particularly strong in cavalry. The campaign of 1806 offers, also, a very clear example of the necessity for having corps cavalry. The cavalry was withdrawn from Bernadotte's corps and the regiments allotted to the reserve cavalry. Bernadotte, who had in his front Bessières with 2 cavalry divisions and 3 light cavalry regiments, feeling his helplessness, asked that his regiments might be given back to him at once, "for it is of the greatest importance that every corps should have cavalry, even when there is cavalry in its front." He was very nearly being surprised.

The number of squadrons to be employed with each corps as divisional cavalry should not be greater than is required to perform efficiently the duties they will be called on to do. Both in Germany and in France it has been fixed at a brigade of eight squadrons. In view of a pitched battle it will generally be practicable to unite the cavalry of the several corps temporarily.

The necessity for an increase to be made to the cavalry is gradually gaining ground. The important new formations of the last few years have almost all been to the benefit of the infantry and artillery. The old proportion between infantry and cavalry has, even in peace, gone back from 4 : 1 to 10 : 1, and in war, on account of the enormous reserve formations of infantry, it will sink as low as 20 to 1. And at the same time the demands on the cavalry have constantly risen. The sphere of their activity, that is their own front to be covered and the enemy's front to be explored, has materially increased in extent. The magazine rifle would soon reduce the existing insufficient number still more, and it will then be hardly possible to obtain the necessary men to complete their strength, for the cavalry is the least suited arm for reserve formations. In consideration of all these points, the several States are now commencing slowly to increase the numbers of their cavalries. Russia has raised a new 15th Cavalry Division, provisionally of three regiments only (47th and 48th Dragoons and 3rd Ural Cossacks). The fourth dragoon regiment which is wanting will, no doubt, be created before long, and to all appearance this division is only the beginning of further new formations. Russia has now 20 cavalry divisions (2 Guards, 15 Line, 1 combined Cossacks, 1 Caucasus, 1 Don Cossacks of 4 regiments, each of 6 squadrons) and 24 sotnias of corps cavalry, to which in war the 1st and 2nd Cossack levies would be added. Austria-Hungary has raised a new 15th Dragoon Regiment. The "Reichswehr" says this by no means suffices, for in a future campaign there would be 782 squadrons opposed to 341 at the disposal of Austria. France, under the authority of the laws of 1887 and 1890, has raised the 30th Dragoons, 13th Cuirassiers, and 13th Hussars, so that she now has 87 regiments, of which 10 are in Algiers and Tunis, and must consequently not be reckoned in the first line.

Night Operations.—These are beginning gradually to become naturalized, but, as yet, not to an extent proportionate to the importance of the subject. They have for years past formed a part of the exercises of the Russian Army, and have now been introduced into France and Italy. During the last French great manœuvres an exercise of this nature was held, and frequent ones at the Italian camp of Caserta.

Magazine Carbine.—This arm has been introduced into the cavalry in Germany, France, Austria, and Belgium.

Exercises in Swimming.—Draft swimming instructions have been issued to the German cavalry. The saying of General Gourko, "Canals and rivers are no longer obstacles to the cavalry," must not be so unconditionally accepted. In the practical trials many difficulties have arisen which at first were not encountered; swimming over

rivers in this way without preparations is not generally feasible. The draft of the German swimming regulations also dwells on this. "If the horses are not in a condition to carry their riders for a considerable distance," it then follows from this that "a stream of some depth and breadth cannot be crossed by a formed body of cavalry without the help of boats."

The "Revue de Cavallerie" arrives at the same conclusions in its paper contained in its September number (1891), "Passage des Rivières." It treats of the three methods—the rider in the saddle (Skobeleff); swimming by the side of the unsaddled horse, saddle, arms, &c., on rafts or boats; and swimming by detachments behind a boat, the men, saddles, and arms in the boat. The latter method is held to be the safest and most desirable. "But in any case an endeavour should be made to have in every squadron some patrols which, lightly armed and provided with light equipment, can swim broad streams without assistance and be able to ride on without delay on the other side." Certainly that must be attempted and, under any circumstances, steps taken to ensure that unimportant watercourses, which often have only a few feet of the depth for swimming, shall cease to be obstacles, and to cause a detour to be made, as is now often the case. Repeated exercises will remove timidity both from horse and man.

Tactics of Field Artillery.

The views regarding the importance of smokeless powder in war generally and its employment by field artillery in particular have been cleared up and have resulted in a settled conclusion. Whether it be true or false can only be decided by the next war. In all armies its consequences are now being taken into consideration in the instructions for fighting and the regulations, &c., which had previously not been done at all, or only in a small degree.

During the course of 1891, smokeless powder was introduced for the field artillery in all armies excepting in that of Russia. It is to be observed that whereas all the artilleries, the French and German at the head of them, were, on the introduction of the new powder, satisfied with the performances of their guns, the Austrian field artillery have, according to the "Reichswehr," raised the initial velocity of the projectile fired by their 9-cm. gun from 448 to 480 m. This apparently is connected with the fact that Austria was at the time on the point of introducing a new shrapnel fuze arrangement to extend the sphere of effect of shrapnel. They had, therefore, a free hand and were able to utilize the characteristic of the new powder—that it strains less the barrel and carriage—by increasing the initial velocity to the point at which the strain to the barrel and carriage would equal that exercised by the old powder. But the importance of a certain increased initial velocity must not be over-estimated; the gain will be only a somewhat flatter trajectory, and, as result of this, greater depth of burst and an increased range of about 200 m.

In former reports the opinion has been expressed that one result of

the introduction of smokeless powder would be the increase of field artillery, which has derived the greatest benefits from it. It was thought that both France and Germany would have increased their artillery. In Austria-Hungary it has actually been done. The corps artillery, which had consisted previously of 5 batteries (40 guns), has been increased by one battery. Besides this the number of batteries on a diminished peace establishment as centres for new formations have been increased by 15, so that each corps now has 3 of them, and in Austria-Hungary cadres are maintained for the ammunition columns and Ersatz batteries; consequently, on mobilization, the field batteries do not have to furnish detachments to any appreciable extent. A further strengthening of the artillery has been effected by substituting heavy guns for the light ones in all field batteries. It is the intention also to arm the horse artillery with the 9-cm. gun, when the pattern will be identical throughout.

In Italy the 7- and 9-cm. batteries used to be included in the same division. In October, 1891, it was ordered that in future the corps artillery is to be composed of 1 division of 4·7-cm. and 1 of 4·9-cm. batteries. Thus, in Italy, the division has become the tactical unit.

It has been everywhere admitted that the value of skill in shooting has been materially increased owing to smokeless powder. In 1890 the Field Artillery Practice School in Germany was much enlarged, and the number of Officers to be trained there annually was doubled; and now, again, a great change is being effected in this school. For the coming year a further increase is contemplated of the instructional Staff, the necessity for which is based on the provision that in future every young Officer is to undergo a four months' course at the school. We receive this innovation with satisfaction, and look for great profits from it. But we regard somewhat differently the abandonment of the Artillery School for the Officers of the field artillery, and we fear that the short period of these Officers' stay at the practice school will not suffice for adequate scientific instruction. In our opinion not only is such instruction necessary for Officers of the foot artillery, but also for those of the field and horse artillery to enable them fully to understand the practice. Theory and practice are by no means in irreconcilable opposition.

The artilleries of all the greater States attribute a constantly increasing importance to good shooting. Following the example of Germany, practice schools have everywhere sprung into existence for the training of artillery Officers; in France and Russia they have existed for a long time; in Italy the practice school established in 1888 was enlarged in 1890. In Austria-Hungary alone the necessary measures have not been taken for training the Officers in firing. A course of practice, lasting 3 weeks only, and in which only Senior Captains awaiting their promotion to Field Officers' rank participate, does not by any means satisfy the requirements of the present day.

In France a practice association of Officers of the Territorial Army has been formed at Paris with a view to encourage skill in shooting; Officers of the Active Army and of the Reserve can belong to it also.

The firing takes place on the Vincennes exercise ground with guns of small calibre and reduced charges at a distance of from 300 to 400 m.

Last year we dwelt upon the necessity for introducing an improved telescope which, by means of its increased power and sufficient size, would cover a large field of sight. At the great distances at which the artillery fight will be carried out in the future it will not be possible to observe the shots without an instrument of this nature. According to the "Reichswehr" each division of the Austrian field artillery has lately been provided with a large tripod telescope, which is carried by a mounted man.

It is generally recognized that smokeless power demands a thorough utilization of ground, so that fire may be opened unsuspected by the enemy and the discovery by the enemy of the position of the guns firing on them may be rendered more difficult.

The selection and examination of the position, and especially the operation of moving up into it, must be conducted as far as possible under cover, for otherwise the position will be detected before fire is opened. If, through an openly conducted examination of the position and an unsheltered advance into it, the position is betrayed to the enemy before fire is opened, half the advantage of smokeless powder is sacrificed. The examination of the proper position and of the approaches to it is now more important than ever, for a mistake made in regard to them is more heavily punished, and can hardly be rectified at all. The recognition of these conditions led this year to three days' exercise in varied ground being ordered for the whole of the German field artillery before the commencement of the autumn manœuvres. We regard this as a rule of great importance. At the manœuvres themselves time generally presses, and hence the danger either of neglecting to take up positions under cover—the most frequent fault—or from want of skill of losing too much time with the reconnaissance of the position and the sheltered approach to it. Useful experiences will therefore not be gained on the manœuvre ground alone. On the other hand, the great utility of the exercises referred to is quite uncontested; the employment of the artillery under service conditions will gain enormously by them, and the more so in proportion to the size of the bodies engaged in these exercises. A commencement should perhaps be made with the artillery division, especially in those garrisons in which suitable ground is not available; but they should also be held by regiments, and even perhaps in still larger bodies. The difficulties increase with the largeness of the formations exercised under service conditions. Even a right judgment as to the space required for the deployment of a large mass of artillery is only to be learnt by means of practice, as well as the discovery of covered ways of approach, the issue and communication of orders, the choice of a covered preparatory position, and, lastly, the advance from this position and deployment to the proper front.

After having, during the last two years, occupied the place of chief interest, the literature on the question of smokeless powder has now

come nearly to an end. We have only two French papers on the subject to mention: "Rôle et emploi de l'artillerie avec la poudre sans fumée," in the March number of the "Journal des Sciences Militaires," and "Modifications à apporter à la tactique de l'artillerie par suite de l'emploi de la poudre sans fumée," by Le Colonel d'Artillerie Marsillon, in the June number of the "Revue d'Artillerie." In both papers it is recorded that the French powder makes no smoke, and this facilitates observation and the service of the guns, but that, on the other hand, a very considerable flash is to be seen at each round, estimated at from 4 to 7 m. in diameter. Both are agreed that, in order to avoid betraying the position of the guns to the enemy, they should be placed behind a screen from 3 to 6 m. high. The conclusion drawn from this, however, by the two writers is entirely different. The "Journal des Sciences" desires a completely covered artillery position with tightly closed intervals. It would, as a rule, employ indirect fire; the Captain should direct the fire from an elevated point, for which rules have been drafted. An artillery engagement, such as, according to modern views, opens every battle, would naturally no longer take place. Unfortunately the rules do not provide for the contingency of the enemy changing his cover.

In our opinion the "Revue d'Artillerie" has adopted a sounder view. Exactly as in last year's report we pronounced against the exaggerated passion for firing from covered positions, so also does Colonel Marsillon. He declares those to be the best positions from which the object can be seen clear over the sights; positions from which the sights cannot be laid on the object are only serviceable if the battery Commander can observe it from horseback or from a point close to the battery, and so unite the direction of the fire with observation. All positions that aim at securing still greater cover he holds to be altogether unfitted for field service. Entirely our opinion. The old artillery adage must always be remembered: first effect, then cover, or, as Colonel Marsillon says, "Avant tout voir et autant que possible ne pas être vu." But if he rejects covered positions, he insists the more on the necessity for remaining concealed until fire is opened, and to this end he wishes to see a reduction in the number of mounted people who, by the French Regulations, accompany in too great numbers the Commander of all formations down to the battery. As it is easier to come into action by surprise the greater the distance from the enemy, the artillery engagement will probably be fought at a longer range than before, perhaps at about 3,000 m., because up to this distance the effect of the guns is amply sufficient. The necessity for guns firing over their own troops is gone into very closely, and it is pointed out that the infantry may confidently approach to 500 m. distance from the point fired at by their artillery, provided that the artillery engagement is being carried out at about 3,000 m. and the ranging is completed.

A change of position in order to complete the artillery engagement at a closer range is held to be unnecessary and impossible; unnecessary for the distance of 3,000 m. admits of a decisive effect being

produced; impossible because the movement into the second position cannot take place without it being observed by the enemy. In this matter we hold other views; so general a rule is always false. If, in the first position, a certain superiority, though not a decisive one, has been obtained, there should be no hesitation in going forward in order to complete the success. If this advance be executed in *échelon* it will undoubtedly succeed, for the batteries remaining in position will take care to draw the enemy's attention to themselves. If one were to be contented to bring about the decision from the first position this might possibly take a long time, and the infantry attack would have to be unnecessarily postponed. Even if the effects of the gun at 3,000 m. should, if it be properly laid, be more than sufficient, looking to its great accuracy, still it is to be remarked that the ranging becomes more difficult in proportion as the object is further away. The shorter the range the easier the observation and therefore also the ranging. Further errors in ranging lose their importance at short ranges, because in these the depth of the burst of shrapnel is particularly great. Consequently everything is in favour of seeking the decision at a shorter distance provided other conditions are favourable.

To prepare the attack, a portion of the artillery should advance to about 1,500 m. of the enemy's position, and bring as powerful a fire as possible on the points to be assaulted. For this purpose, a zone of 100, or at most 200 m. in breadth, should be allotted to each battery, which will bombard it with the hottest possible quick fire, 10 shots in the minute, for about half an hour. We cannot, however, think that such quick fire would be of great use, and will give our views about this later.

During the assault the artillery should assist the infantry with their fire, but without advancing their guns, an axiom which is undoubtedly correct with smokeless powder, when every movement must be immediately detected. A battery which should attempt to unlimber in face of hostile infantry at distances under 1,500 m. would sacrifice itself quite uselessly, and make just the opposite impression on its own infantry to that contemplated. Only after the capture of the enemy's position should the artillery think of advancing for the purpose of securing the position against hostile counter-attacks.

Colonel Marsillon proposes that the horse artillery should be armed with small-bore guns, with very flat trajectory, so as to be able to dispense with ranging when preparing for the cavalry attack, when time is wanting. It appears as if experiments to this end are being made in France; for the hope is expressed that the batteries attached to the cavalry may soon be in possession of such an arm. According to our view, horse artillery is attached to cavalry less with the object of preparing for the cavalry attack than for the support of that arm when carrying out its duties in screening the front of the army, that is to strengthen its powers of resistance. To arm the batteries with quick-firing guns of small calibre would incapacitate them from carrying on an engagement with normally armed artillery,

and consequently a weakening of the horse artillery will ensue. As quick-firing guns are not suited to general purposes, Colonel Marsillon wants one of the three batteries to have guns from which melinite shells could be fired, in order to produce an effect on objects capable of resistance.

The literature of the past year has frequently dealt with the question of the distribution of the artillery with an Army Corps, especially the abolition or retention of the corps artillery.

This question is considered very thoroughly in connection with the history of the 1870-71 Campaign in the "*Revue Internationale*" (June to September numbers, 1891), in a paper entitled "The Distribution of the Field Artillery within the Army Corps." The writer follows it through all the phases of battle, and comes to the conclusion that the dissolution of the corps artillery would result in advantages only, and lead to no disadvantages, so far as the battle itself is concerned, and further that the removal of an administrative unit with all its services would facilitate the arrangements for marching, quartering, and supply. In his opinion horse artillery is required with the cavalry divisions, but not with the corps artillery. He proposes, therefore, to place each of the field artillery regiments with a division in peace; "means would then certainly be found for arranging during peace the position of the Artillery Brigade Commander with regard to the Commanders of the two divisions." Much as we desire to see the field artillery placed under the divisions, for we should regard this step as the completion of the new order introduced by the abolition of the general inspection, still we cannot agree to a proposal which would inevitably lead to continual conflicts in regard to jurisdiction, and must end in the Brigade Commander being placed altogether on one side. We consider the best solution of the question to be the allotment to each division of a field artillery brigade. Such a brigade would consist of 10 batteries and 5 ammunition columns, a force the strength of which would be suitable for a General's command.

In opposition to this view a writer in the "*Jahrbücher für die Deutsche Armee und Marine*" (July number, 1891, "Divisions-, Corps-, Armee-Artillerie,") seeks to prove the advantages of a separately organized corps artillery. The unknown writer bases his argument on a statement made in a paper in the "*Militär Wochenblatt*" (Nos. 44 and 45, 1890; "*Die Vertheilung der Artillerie innerhalb des Armee-Corps*"), which maintains that the abolition of the corps artillery would be of advantage in almost every case when the Army Corps was advancing on two roads, and that this might be accepted as being the rule. In answer to this the present writer seeks to prove that the contrary is the case, by means of numerous examples. Eight engagements and battles during the first period of the 1870-71 campaign, in which 31 Army Corps formed larger masses, are investigated to ascertain whether their advance was by one or by two roads. It is shown that the advance of 19 was on one road, and 12 on two, from which the conclusion is drawn that the advance by two roads is not the rule. But this result is only

obtained by including the battle of St. Privat. In regard to this there could be no question of the advance being on one road, the corps marched rather massed in broad columns across country. If these corps be excluded from consideration, there remain 11 corps that moved on one road and 12 on two roads. But from those 11 corps must be deducted also the IInd Bavarian Corps at the engagement of Weissenburg, the divisions of which on the day of the fight were $2\frac{1}{2}$ German miles apart. The action of this corps tells altogether against corps artillery, and in favour of the distribution of the entire artillery to the divisions.

Field Gun-brake.—An effective brake has already been adopted for the field artillery in many States; in others experiments are still being made. Combined with the employment of smokeless powder, a good brake allows of the gun being made ready for firing again in a shorter time than was previously possible. The German regulations of 1877 laid down the rate of firing at from three to four shots a minute. Since that time sponging out has been discontinued, the new powder and side-sights facilitate the laying, and the brake will minimize the most fatiguing work of all, and that which occupies the most time—running up the gun after each shot. It is laid down that when the brake is used a battery of 6 guns will fire 10 to 12 shots in the minute, rapid fire, in place of from 6 to 8, as previously. Such an improvement cannot fail to produce a considerable effect; the question is how is this advantage to be utilized, and what consequences will result from it?

The opinion that the greater readiness for firing will in future lead to an increased rapidity of fire is very general. If hitherto with ordinary fire 3 to 4 shots a minute has been the rate, in the future it will be at least 5 to 6. Therefore regard must be had before everything else to the provision of ammunition with the batteries. If hitherto 135 rounds per gun has been considered a sufficient supply, then in the future about 215 will be required. But it is impossible either to place a heavier load on the ammunition wagons, or to increase the number of these from eight to fourteen, so as to carry the necessary number of rounds. It only remains, therefore, to reduce the size, and especially the weight, of the projectiles.

This train of thought, in which the conditions applicable to the rifle have been unconsciously referred to the gun, conceals a great error. With the rifle it is, as regards the effect of a hit, quite indifferent whether the bullet is a little heavier or lighter. Consequently, other conditions being equal, there is a probability of obtaining greater results from increased rapidity of fire. The conditions are altogether different with the gun, where the effect of shrapnel is influenced in a high degree by the number of bullets contained in it, and, therefore, by its weight. Whether 200 shrapnel of 5 kilos. or 125 of 8 kilos. are fired in the same time does not matter much, provided the number and power of penetration of the bullets are the same, and also the accuracy of the fire. But it is evident, that if in the 8 kilos. shrapnel, $3\frac{1}{4}$ kilos. (or 42 per cent. of the whole weight) are represented by the bullets, this proportion cannot be nearly attained with

the shrapnel weighing 5 kilos. Such a projectile, if constructed on the same principle as the shrapnel now in use in Germany, would at most contain 140 bullets. In firing 200 rounds, therefore, 28,000 bullets would be discharged on the enemy, whereas in the same time with only 125 shrapnel of 8 kilos., 32,500 bullets would be thrown, that is, 4,500 or 16 per cent. more.

The writer of an article in the "*Jahrbücher für die Deutsche Armee und Marine*" (December, 1891) discusses the effect of the introduction of quick-firing guns on the shooting of field artillery. He would effect the ranging by means of one section only of the battery, because the firing is then sufficiently slow to allow of this, and errors are better excluded if the battery Commander has only to do with two Nos. 1 in place of six. On the completion of the ranging the whole battery take up the fire, which should be conducted with the greatest possible rapidity. The writer estimates the power of the increased rapidity of fire so high that he believes it will again make artillery superior to infantry up to 1,500 m. In our opinion there is no unconditional superiority of the infantry over the artillery within this limit. If the artillery is in position, and is not surprised by the infantry, it will always succeed in driving them off at ranges of from 800 to 1,000 m.

On the other hand, infantry which surprises artillery can, even at greater distances, bring such a fire to bear on the artillery that their greater rapidity of fire will not help them. Until the ranging is completed this does not avail, for the next shot cannot be fired until the preceding one has reached its destination and been observed. But if the ranging has succeeded, the victory of the artillery is assured equally whether it shoots a little quicker or more slowly. Its fate now no longer depends on a few seconds; for, if the hostile infantry has not mastered the artillery while it was ranging, it will certainly never do it at all, and its unfitness for further fighting will be sealed by the next half dozen rounds.

Our view is that artillery now, as before, must adhere to the principle of observing every shot, even after the ranging is completed. The rapidity of fire will, therefore, not be materially altered; the average rate will perhaps be nearer four rounds than three in the minute, for the perception and observation of the shot on striking has become easier, owing to the absence of the disturbing smoke. We cannot count on any real advantage from the increased rapidity of fire. Either the ranging has been correctly accomplished, in which case the fight is disposed of by two rounds of shrapnel. Whether these are fired in three minutes or in a minute and a half is of no importance, for a change is hardly to be thought of after the ranging is completed. The decision has already been determined by the first round of shrapnel. But if the ranging is incorrect, the rapid fire that follows it is not only useless, but actually harmful, for it costs much ammunition, makes the recognition of the error committed more difficult, and causes unsteadiness amongst the gunners. We can only look for utility from a prolonged rapid fire in the case where the ranging has succeeded in forming a long bracket; the space between

the two distances ranged must then be swept rapidly to and fro by means of rapid shrapnel fire. This applies also to the bombardment of objects such as infantry, for example, sheltered behind earthworks of strong profile which offer little prospect of an effect being produced on them, and success against which must consequently be associated with a large expenditure of ammunition. In both cases sufficient effect can only be produced by a large number of rounds, perhaps forty or fifty, and therefore greater rapidity of fire may be of use. Instead of the object being rendered unfit for further resistance in perhaps fifteen minutes, this time might, by the employment of rapid fire, be reduced by a half.

We are of opinion that the greater readiness to fire can be best utilized by reducing the number of guns in a battery. Indeed, the strength of a battery should depend principally on the time occupied by the guns in getting ready to fire. A battery is properly composed—that is, it will offer the greatest possible degree of useful effect, if, in the ordinary firing from a flank, the gun on the one flank shall be ready to fire immediately the gun on the other flank has been discharged. If the batteries are stronger than they need be to satisfy this condition, then many guns are exposed uselessly to the enemy's fire, and consequently to losses. Thus, for example, even in the time of black powder the Austrian and Russian field batteries, of eight guns, were too strong, which has at length been recognized by them.

The sound deduction to be drawn from the greater readiness to fire would be, that the strength of a battery should be reduced from six guns to four, and the number of batteries increased proportionately. In an Army Corps that has the disposal of 20 batteries, 40 guns could be withdrawn from the firing line without loss of fire effect. If the men and horses thus made available were to be employed to form 2 or 3 new batteries, an increase in power would be gained far greater than is numerically expressed. Naturally 8 ammunition wagons, as before, must be retained for the batteries of 4 guns, for the 4 guns would fire just as many rounds in the aggregate as the 6 guns of which a battery now consists.

These small batteries would be better trained and easier to command, not only because all the batteries would have the same number of guns in peace and war, but also because the battery Commander can superintend and command orally 4 guns easier than he can 6, and because the number of Officers would be proportionately greater than hitherto. Moreover, the smaller batteries could utilize the ground better; difficulties as to space which necessitate the diminution of the intervals between guns would be altogether avoided. By means of both the effect of the enemy's fire would be diminished.

The smaller batteries would also admit of the provision wagons being reduced from 3 to 2, so that the battery would have 15 vehicles in place of 18. If this be the case 4 more batteries could be added to each Army Corps without an increase to men or horses. These 24 batteries, with a total of 96 guns, would undoubtedly be superior to 20 batteries with 120 guns, particularly for the artillery engagement, on which everything depends. The 24 batteries with 192

vehicles would not occupy any greater length on the march than the 20 batteries with 200 vehicles. Only when firing case and during prolonged rapid firing the small batteries would not produce the full effect of the larger ones. Case fire occurs so exceptionally that a tactical measure, otherwise desirable, should not be rejected on this account.

It is different in the cases referred to above, in which the end can only be gained by means of a greater expenditure of ammunition; somewhat more time would be occupied over this than with the existing constitution of the batteries. With single batteries half as much time again would be necessary; but this difference would undoubtedly be diminished in some degree by all the commands being executed more easily and quickly in the small batteries than in the larger ones. This must be especially the case in firing salvos, which would in such conditions be especially suitable. As also the number of batteries is increased, the difference in time would be still more diminished.

Extensive trials can only determine conclusively whether the supposition that batteries of only four guns can maintain an uninterrupted fire from a flank is justified in all circumstances, especially in difficult ground. If it is the case, then our proposal offers such considerable advantages, particularly for the artillery engagement, that its inherent imperfections are fully outweighed. In any case, the question what consequences will follow the increased readiness for firing due to the employment of smokeless powder and the brake is one of the most important of those awaiting early solution.

Tactics of Fortress Warfare.

Present Situation of the Subject.—The past year has resembled its predecessors in this, that numerous suggestions in regard to fortress warfare have been made by means of military literature; but the conflict over the questions connected with this warfare, in which hitherto the opposing ideas have come into sharp collision, has passed into quieter waters. The conviction has, indeed, made way everywhere that one cannot simply throw overboard all that science has hitherto taught on the subject, but that it should only be developed and modified in accordance with the spirit of the times. There is, therefore, nothing more to be heard about the theory of the superfluity of permanent fortifications, of dismantling large places, or opening them to the rear, or about the idea that improvised and movable fortifications, which could be moved as required to the spot where they were wanted, would completely suffice.

On the other hand, it has been represented to the advocates of an earlier view, who wished to expend off-hand untold millions over the construction of the most complete fortifications possible on every important point, that it should first be considered whether the necessary forces and means existed for the efficient defence or use of these fortifications; whether, owing to the progress of artillery science, those works might not have become unserviceable before an oppor-

tunity should arise for them to fulfil their object, or if other technical progress would not make it possible to attain the desired ends in a simpler and less costly manner. The measures that all the greater States are actually taking for the protection of their territories follow in effect a line between these two extremes. Everywhere we see large sums being expended on those points at which changes in the strategical or political conditions necessitate new or modified constructions, or the security of new communications by land or water render fortifications indispensable.

All these measures, as well as the general inclination shown to include operations connected with fortress warfare in the peace exercises, and to bring them into connection with field manoeuvres, point to the conviction that sooner or later modern armies will find themselves face to face with the problems of fortress warfare. There will not only be, as in former times, the principal operation of besieging or attacking large fortified places; but, even during the mobilization period and the first days of the war, fortifications and the fighting around them will play an important rôle. In regard to the latter, the deductions in General v. Verdy's work (*"Studien über den Krieg, I. Thiel, Freignisse in den Grenzbezirken"*), published last year, are very instructive, in dealing with the conditions on the frontiers during that period. Following the experiences of the last war, the principle has been generally accepted that the peace garrisons of the territories situated on the frontiers must be made stronger than formerly, so strong, indeed, that they shall be enabled to occupy important positions on the frontier, and maintain them until the arrival of reinforcements, so as to hinder as much as possible their being passed by hostile troops, and especially by cavalry swarms, which would disturb the mobilization, cause all sorts of damage, and produce a depressing moral impression. The writer does not contemplate any lasting favourable result from such enterprises, for it will often be found more difficult to get out of an enemy's country than it is to get into it; still these enterprises will be undertaken, and it is pointed out that the fortifications situated on the frontier must take an active part in frustrating them. It follows that, whether these be in the form of barrier forts situated at short intervals from one another, or of places of arms commanding an extended area of the country, both matériel and personnel must, wherever possible, from the first day of mobilization be ready to take part in military operations, and to maintain this activity whilst the mobilization is being carried out and ended.

In the same manner as this applies to the defence, so also the principle is now accepted for the offensive, that simultaneously with the mobilization of the field army, all the means required for operating against permanent fortifications must also be prepared. The general recognition of these principles and the preparations made for their application in the future mark an important advance in the tactical conditions of fortress warfare, as they existed in the last wars, and indicate further that the connection between field operations and fortress warfare has been drawn much closer. So

far as the matériel is concerned, these preparations have been carried out by all the great States. Constant endeavours have been made to develop the rifled system of ordnance in size and effect in many directions; the most powerful fire effect is at disposal upon objects of the most diverse nature, by the flattest as well as by a more or less curved trajectory. Sufficient mobility has also been given to a great portion of these guns—considerably superior in fire effect to field guns—to make them follow the field troops without difficulty when taking the offensive, or, on the defensive to take position rapidly at the most important points, and in case of necessity to change these positions. Besides this, measures have everywhere been taken to ensure the necessary train for the siege of fortified places being set in motion in sufficient time to obviate the necessity for the field army wasting valuable time after the investment, before the regular attack can be commenced, as was the case in 1870, before Paris. But if the progress in regard to the matériel has reached a point at which its cessation may be expected, this is not so in the case of the personnel. Certainly in the Reports we are able yearly to record certain advances in the increase, organization, and training of the troops destined for fortress warfare in all the great armies. In regard to the training, important steps have been taken, especially in Germany. But matters are still in the beginning stage, in this direction, and the fundamental ideas in regard to organization especially, which have for years past been discussed in the military press, have not yet found an outlet. In France, when Boulanger was War Minister, the idea was originated of uniting the fortress artillery and engineers in one body of troops, and in German military literature the view was frequently expressed that special fortress troops must be organized. The time is indeed long past when anything was thought to be sufficiently good for the defence of fortresses; everybody now knows that at least a portion of troops fully efficient for field service must be allotted to the garrisons of the fortified places in the vicinity of the theatre of war or of the frontier, and that they should have a knowledge of the country to be defended. Different arrangements have been made in different States for this purpose, such as the establishment of peace cadres for special infantry fortress battalions, detailing Line regiments which would remain in the garrisons in war, &c. But for that arm which in concert with the engineers would be most active in fortress warfare, the carrying out of a scheme of organization in accord with the new tactical conditions of this warfare is not completed. In Germany, however, such an idea is perceptible in the fact that many expressions of opinion respecting the insufficiency of the foot artillery have been discussed, and the new organization of the engineers and fortress services. The prevailing idea is undoubtedly to unite the foot artillery with the fortress pioneers in a separate body of fortress troops; the field pioneers to be amalgamated with the infantry, the instruction of which in pioneer duties would be extended, and that then a general staff for fortress warfare should be formed from these troops.

Russia.—The principal efforts have been directed to the extension of the railway system in the western portion of the Empire and the further completion of the artillery matériel. Although large masses of troops have been pushed forward near the western frontier, still it is of importance that sufficient lines of rail should be available for bringing up further reinforcements from the more distant portions of the Empire. Amongst others, two important lines have been made available, one from the Sea of Azof to Kursk to facilitate the transport from the territory of the Don Cossacks, the other in a south-westerly direction to Lodz. The latter was constructed during the great manœuvres in Volhynia by the railway corps, to the organization and training of which great care has been devoted. Other reports speak of the extension of the railway system in southern Russia; but the transport of large bodies of troops here would encounter great difficulties in the present distress in these territories, especially in winter. An endeavour is being made, therefore, to obviate these difficulties by laying a double line of rails on the main lines, and similar methods.

A 3rd regiment of light siege batteries was raised at the end of 1890, and these regiments are now stationed at Dunaberg, Bialocerkiev, and Novogeorgievsk; each consists of 4 batteries with 6 guns, 6 ammunition carts, and 18 ammunition wagons. The limbers carry only 8 15-cm. shot of 40 kilos., so that an adequate immediate supply of ammunition must be provided by means of wagons. The further supply has in the first instance to be obtained from the flying mortar artillery parks, of which there are in peace 2 and in war 4, with a probability of increase to 3 and 6. These in their turn are completed from the two movable mortar artillery parks, which are to be supplemented by another for the third regiment.

Much energy is being displayed in testing and perfecting the various auxiliary services, such as cycles, balloons, and range-finders. The former after many years of trial have been introduced into all the infantry field troops; they are destined principally for the special hunting detachments, and will be gradually attached also to the fortress and reserve troops. They would be used for the more rapid transmission of orders and reports during movement, and for the field post within the sphere of the quarters occupied by the troops, and in the field army. A detailed account was given in the "*Militär Wochenblatt*" (No. 78) of the experiments carried out respecting the effect of artillery fire on balloons. They were conducted as far as was possible under service conditions, and proved that a balloon could not venture into the sphere of shrapnel fire; for at a height of 1,200 feet the one fired at was struck and began to sink at the eleventh round.

As regards the personnel, according to the "*Revue Militaire*," 3 new fortress infantry battalions have been formed (2 at Zgierz, 1 at Kovno) each of 5 companies, 30 Officers, and 522 men. On mobilization each battalion would form a regiment of 5 battalions, 19 Officers, 4,926 men. After, in 1890, the 2 companies of fortress artillery of the Turkestan military district had been formed into a

battalion of 4 companies, there remained only 5 independent companies, 1 at St. Petersburg, Dubno, and Bobruisk, 2 at Vladivostok. The number of battalions is 51: 6 in each of the garrisons of Warsaw, Novogeorgievsk, and Cronstadt, 4 in Ivangorod and Brest-Litevsk, 2 in Ossovetz, Kovno, Dunaburg, Viborg, Sveaborg, Kief, Kertch, Kars, and Poti-Michaelovski, 1 in Dunamunde, Bender, Oczakov, Sebastopol, Alexandropol, Terek, Daghestan, and Tashkent. The battalions consist each of 4 companies, excepting those at Oczakov, Sebastopol, and Kars, which have 5, and that at Poti-Michaelovski, of 3 companies. There are 5 fortress sortie foot batteries in Warsaw, Novogeorgievsk, Ivangorod, Brest-Litevsk, and Kovno.

In the place of the two Directions for submarine mining services in the Baltic and Black Sea, 8 fortress torpedo companies have been included in the garrisons of Cronstadt, Sveaborg, Viborg, Dunamunde, Oczakov, Sebastopol, Kertch, and Michaelovski (at Batum).

France.—Although the railway system in this country has for long been far more complete than that in Russia, much activity has been displayed during the past year in extending it. In doing this the intention is evident to provide for the transport of troops and war material to the eastern frontier. For this purpose the construction which has been undertaken of a new line from Paris to Rheims is of special strategical importance, for it will provide a direct and rapid connection between these two places. The partial completion of a second set of rails between Veynes and Briançon is also of strategic importance; it will connect the latter fortress with Lyons and Marseilles, and will soon be joined to the lines to Nismes, Montpellier, and Toulouse, by a line to the Rhone valley. The opening of the following sections is also announced: from Aurillac to St. Denisles-Martel; Lons-le-Saulnier to Champagnols; d'Estrées to St. Just-en-Chaussée; Charroux to Kessac-les-Châteaux (Givray-Leblanc line); Bayonne to Cambo; Bayonne to St. Jean Pied-de-Port, and the first section of the line Vigne-Nice, as far as Brézel. This last one, in spite of the protest of the military authorities, is laid with small gauge; but it is to have a third rail so as to be available in time of war for wagons constructed for the normal gauge.

As in former years, some of the older fortresses, that have lost their former value, have been dismantled, to assist in the equipment of new works. The fortresses of Douai and Arras are amongst these, and a portion of the Belfort ramparts, which have become unnecessary owing to the construction of new works. It has also been decided to construct six infantry works at Belfort, on the right bank of the Savoureuse. The strengthening of the Cherbourg fortifications, including the protection of the harbour, is also planned.

According to the "*Revue d'Artillerie*," the immediate object of interest, in regard to artillery matériel, is the construction and trial of quick-firing guns of heavier calibre (10-, 12-, and 15-cm.) for use, primarily, on board ship. In respect to personnel and auxiliary services, a Committee has been appointed to consider the entire question of cyclists. The adoption of permanent cyclist formations seems

secured after the favourable experience of them in connection with the manœuvres, and the necessity for them in case of war.

Austria-Hungary.—The credits available have, according to newspaper reports, been principally applied to ensuring the security of Transylvania against a possible Russian concentration in Bessarabia. There is, therefore, nothing of importance to record in regard to general organization. Further trials have been made with the 10·5- and 12-cm. howitzer, which are destined to supply a requirement still wanting in almost every artillery. These guns, equally well adapted to complete the effect of the field guns at the proper time, or for employment as movable siege and fortress guns, are destined to play an important part in the future. Attention is also being paid in Austria to the improvement of the projectiles and their effect, as well as to the new explosive. Experiments were made at Pressburg with “ecrasite” upon various objects, amongst which was a block-house redoubt 2 to 3 m. high, with earthen parapets and pallisades. It produced the effect of double its amount of dynamite.

It is interesting to remark that in Austria, as in Russia, special attention has been directed to the peculiarities of a winter campaign. In recent years the engineers have been occupied at their exercises with the construction of provisional shelters, camp details, snow huts, and the application of explosives in breaking up ice; experiments have also been made in transporting artillery equipages in deep snow.

Italy.—An armoured revolving tower has been completed at Spezia for the defence of the approach to the harbour. As regards the Alpine barrier forts, it is stated by the “Italia Militare” that arrangements have been made to occupy, during the winter, the six forts situated on the Col di Tenda and in its vicinity with a small detachment of the 1st Alpine Regiment and two men of the Mountain Artillery. As regards artillery matériel, attention has been principally directed towards increasing the effect of projectiles, to which the application of double fuzes to siege and fortress artillery has contributed. Experiments have been continued with the high-explosive “ballistite,” which has been shown to be also adapted to use with field guns.

Some Questions of Fortress Warfare, with reference to the most recent Military Literature. As has already been noted, some certainty has resulted from the public discussion of questions connected with fortress warfare, that they are not to be met by a complete revolution or even by a change in the adopted methods; but rather by their proper development to meet the progress in armaments, new means of war, and the changes in the art of war necessitated by these. A basis is thus gained to which the solution of the questions of fortress warfare ever springing up anew in connection with the progress of technical science may be referred. If a glance be cast on the manner in which the various States are carrying out their system of fortifications, it will be seen that in the first place the ground is selected on the several fronts of the place to be fortified which appears to be the best suited for the main line of defence. Equally with fortifica-

tions for special purposes, such as frontier or coast defences, the most suitable points are chosen.

In these sections again the most important and commanding points stand out; but on these positions guns are not massed as formerly, for though these promise, indeed, an extensive fire effect, they mark also a very favourable object for the enemy's concentrated fire. As, however, this fire effect from the most commanding spots cannot be altogether dispensed with, they are occupied by a few of the most powerful guns, which are rendered as invulnerable as possible by the application of the most modern scientific means (Armstrong parapets covered with beton, &c.), and equipped with every expedient for easy service and good effect. The girdle-line, which is constructed in this way in most systems of fortification, now requires supporting points, and these must be established with special regard to the requirements of "infantry works," because the infantry will here have to play a principal part; the participation in support of light guns is not, however, to be excluded from the arrangements. In connection with the works referred to above, or covered by them, suitable positions will then be fixed for the principal artillery engagement. The place for the mass of long-range guns destined for this will be in the intervals between the forts and the supporting points, and generally in positions already prepared in peace-time. Further, by improvising positions in front and behind the girdle-line, as well as in this line itself, it will be possible to complete the passive by means of active defence, in a greater degree than formerly. In order, lastly, to neutralize the breaking through the girdle-line by the attackers—for this can rarely be rendered continuous and capable of resisting assault throughout—a citadel with closed *enceinte* cannot be dispensed with. If this is at a great distance from the girdle-line, it will be indispensable to prepare positions on the ground lying between the two fortified lines, by means of which the attackers who have made their way in may be repulsed; they will also be exposed in their position and during their eventual retreat to the fire from the gorges of the girdle-works.

This brief description of the present arrangement of permanent fortifications, so far as they are not affected by local conditions or special objects, corresponds in the main with the statements advanced in Colonel Welitschko's important work, mentioned in the last year's report. The principles enounced by the writer differ in individual points, because he had in his mind the conditions of the great modern fortresses situated in the flat ground of his own country. In the first place he wishes to banish all long-range guns from the forts; but by doing this the artillery of the defence would give up important advantages it possesses over the attackers.

The forts, which are mostly situated on commanding points, afford the guns an advantageous position in regard to view, observation, and fire effect; they admit of every preparation being made in peace-time for cover and effect, for easy service, ammunition supply, &c., for the employment of the latest scientific means, and they will allow the defence to bring guns into action of a calibre such as the attackers

will not often be able to bring up. The writer is against the use of armoured towers, and gives the preference to earth and beton for purposes of cover; but in this view he is pretty well alone, as is evident from a glance at the newest fortification works constructed in the various States; at least the use of both will remain in force for a long time to come. A further proposal of the writer's is to furnish the girdle-line with a line of rails protected by a glacis, and to connect with it numerous radial lines, so as to be able at any moment to bring a crushing fire on any required point. This proposal is not new, it is to be found in books of instruction at the beginning of the sixties; but it is to be remembered that the construction of the girdle-line with the necessary acquisition of ground demands enormous expenditure, and that with fortresses situated on uneven ground insuperable difficulties may oppose its construction. The working of the radial lines would be difficult to protect against interruption by the enemy's fire, so that good roads would often make more secure communications. Entirely in the sense of this report Welitschko points out the impossibility of replacing permanent fortifications by field works, and also the necessity for closed defensive lines. He further expresses himself energetically against the predilection of many for fortified advanced positions far to the front, whereas he advocates sorties. Here also it has been held that advanced positions must always lie under the commanding fire of the girdle-line, unless their occupation is to operate to the disadvantage of the defenders, and that the centre of gravity of the defensive action must always be placed on the girdle-line, and not in the advanced positions.

Following the foregoing principles of Welitschko is a proposal for the type of a supporting point in the girdle at Miaskouski, communicated by Captain Bussjager. He wishes also to dispense with any long-range guns in the forts, and regards the purpose of these to be fulfilled if they arrest during the entire course of the siege all attacks on the contiguous intervals, and by this means force the attackers to capture the supporting points, which can only be done by regular approaches, provided the detailed dispositions are suitable.

Another Russian author (Enzmann) expresses his views in regard to these dispositions. The supporting points of the girdle-line should, he says, be in part such as will be safe from assault on account of natural obstacles, wet ditches, &c. But the rest will have to be secured by means of artificial obstacles of the most varied description. To this end the construction of, or preparation for, a suitable system of mines is specially recommended. The defenders must endeavour to dispose and equip all the supporting points of the girdle-line in such a manner as to force their opponents to proceed by regular approaches up to the crowning of the glacis. On the other hand, the attackers will regard as next in importance to securing the preponderance in the artillery engagement, to resort to a shorter method of attack whenever and wherever the opportunity offers, and endeavour to seize by assault one or other of the supporting points. Though such an undertaking can only be exceptionally allowable and

successful, in face of the actual means of defence, still all armies must be prepared to resort to it and exercised in overcoming obstacles.

This is being done especially in the Russian Army, as is to be seen from the reports concerning the exercises there of the sapper brigades; they also furnish information regarding the means of surmounting different kinds of excavations and artificial obstacles. In connection with this, a suggestion is offered, that for the difficult work referred to a special formation, such as exists in Russia, may perform good service. Up to the present, intelligence has only been received of the employment of the "hunting" detachments in extraordinary performances, which are of value only in connection with field work; but, as they are formed of men selected for special boldness and physical qualifications, who are trained to overcome difficulties and dangers, they would find a suitable field of action in the most difficult tasks of fortress warfare. These formations, the creation of which in Russia is justified by the unequal quality of the material for filling the ranks, and for the action of which a favourable ground is offered by the peculiar condition of the country, have not been considered necessary in other countries.

But this reference to them attracts attention to the questions connected with the tactical employment of the special infantry formations as they exist in Germany, that is to say, to the jäger battalions. The latest war experiences had justified the previously often-repeated opinion, that the disadvantage of such a special body of troops was that often they were not on the spot where better value could have been expected from their employment than from other troops; and, on the other hand, they had to be employed in the same way as these where the numerical inferiority of the latter made it necessary. This was the reason that they were constantly employed on outpost duty during the investment of fortresses, and also in other places they were preferably utilized for this purpose, when infantry could have performed it equally well. In consequence of these experiences, a cry was raised at the time against the whole arrangement; but, apart from military considerations, there were other grounds for their retention. But now the question being discussed is how their advantages can be better utilized in war than formerly.

In fortress warfare the jäger will only be employed exceptionally and where their special shooting qualifications can be made use of, such as to fire at letter-carrying pigeons, &c., and they will be at the disposition of the General Commanding for special purposes, such as the protection of communication to the rear or other missions, also to be held in readiness as a reserve. At the commencement of the formal siege, the jäger battalions that can be dispensed with on the other fronts will be assembled on the field of attack and made use of extended in the most advanced trenches, where their superior shooting will be of value, especially when closely engaged. Similarly, as regards their employment in the defence of fortresses in which the Commandant reserves to himself the disposal of the jäger. They would there be attached in small groups to the infantry outposts, especially on the front of attack or where they are likely to be of

special use, and employed in minor undertakings, sorties, &c., and, lastly, employed against the enemy when fighting at close quarters.

The above-mentioned questions of fortress warfare, which have been prosecuted with so much attention in the Russian Army, have been accepted in France, so far as Welitschko's views are concerned, as is evidenced by the new fortifications at Belfort. According to "*La France Militaire*" the object is to form from a number of existing works of the first class the same number of independent groups of fortifications which will be strengthened by works of a subordinate kind; by this means the works of the several sections will be made independent of one another. The works to be constructed will receive infantry troops and provide secure shelter for them; they are, therefore, called "infantry works." A similar agreement of view occurs in the question of the fortification of the capital, regarding which the Russian General Kui has delivered a lecture in St. Petersburg (see the "*Militär Wochenblatt*," No. 20). He stated that this undertaking is only necessary when the capital represents, so to speak, the head and the heart of the entire country, and when its fall would represent the end of every struggle on the part of the nation and the destruction of the Empire, a fall which is accepted as applying to France, and which, therefore, justifies the endeavours to make Paris into an important place of arms, whereas the conditions are different in Russia. It is admitted that the circumstances of most of the other States resemble more closely in this respect those of France than the conditions in Russia; consequently the necessity for fortifying most of the capitals. Where this cannot be carried out in peace-time, then, as already mentioned in these reports, on the outbreak of war, the defence of the capital must be taken into consideration, and can be sufficiently provided for by the existing means for provisional works. According to General Kui, the best results will be obtained from fortifying a capital when:—(1) it is not exposed to the dangers of starvation or of bombardment; (2) the regular attack by the enemy will meet with difficulties; (3) the offensive operations of the defending army can be carried out without hindrance; (4) the garrison can be separated from the inhabitants. This is certainly true, but these conditions will not generally exist in capitals.

The General recommends two methods of fortification—1st, a normal fortress with advanced forts a long distance in front; 2nd, a town surrounded by intrenched camps (Brialmont's system). The latter would certainly be the most suitable for all great capitals if they have no old fortifications. Lastly, the General considers the best system of defence to lie in the manner of grouping the fortresses; this, also, is certainly correct, but most States are not in a position to undertake a new grouping, and can only complete and improve the existing system.

THE FRENCH NAVAL MANŒUVRES.

Prepared by permission from the special correspondence of the
"Temps," by Commander H. GARBETT, R.N.

THE French Naval Manœuvres of this year have been of a totally different character to those of 1890 and 1891.

In 1890 the junction of the Mediterranean Squadron with the armoured division of the North in the Channel afforded a good opportunity for the study and practice of the different tactical formations of a fleet. In 1891 the fleet, which must be considered as possessing somewhat less speed than the English ships or the latest constructions in the Italian and German Navies, had a very important question to solve, viz., whether, in spite of a certain inferiority in speed, it is possible for a squadron to keep touch with another, by means of fast cruisers. The manœuvres of last year in the Mediterranean furnished some useful lessons on this head. The reports of the Commanding Admirals and the Captains of ships which took part in the manœuvres of 1890 and 1891 have formed a basis on which to lay down a new system of naval tactics.

A Commission appointed by M. Barbey, the Minister of Marine, in last October to enquire into the question, forwarded at the beginning of this year to that Minister the results of their work. Although the theories of naval war have been, in a general point of view, sufficiently studied, certain special points remained to be considered, necessitating a careful enquiry into the coast defences and their organization.

Last year, both in the Chamber and Senate, a certain disquietude was manifested with regard to the system of coast defence; a measure was introduced on this subject, in addition to which the report of M. Brisson on the Naval Budget contained, among other reforms, a plan for the complete reorganization of the "Défense Mobile" of the ports. Although M. Brisson resigned his chairmanship as President of the Committee before the discussion on the Budget, the measures which he recommended have been partly adopted. The system for the "Défense Mobile" has been modified, and this year's manœuvres had for their object the ascertaining of the efficacy of the measures taken, and the principal interest, therefore, has been centred on the defence. The scene of operations by the Mediterranean Squadron against the coast was comprised between the meridians of Cape Couronne and Villefranche, and that of the Northern Squadron between the meridian of the rocks of Primel and the parallel of the Island of Sein. It was not considered necessary to prepare a settled programme in advance for the movements of the belligerents. The rôle of the coast defence is to guard

against all surprises and unexpected attacks. The belligerents, that is to say, the Commander-in-Chief of the attacking fleets and the Maritime Prefects commanding the defending forces, were allowed perfectly free hands.

The resources at the disposal of the Maritime Prefects for the protection of the coasts of their arrondissements are of two kinds, those which constitute the means of defence properly so called, and those which are simply accessory thereto. The first category comprises the coast batteries, the mobilized coast-defence vessels, the torpedo-boats, and the mine-fields and other obstructions laid down at the entrance of the harbours; in the second category are included the means for scouting and transmitting intelligence such as semaphores, telegraphs, carrier pigeons, balloons, &c.; all these were placed at the disposal of the Maritime Prefects.

The following measures were taken for the Intelligence Service:— Each of the Maritime Prefects was to establish a central bureau for intelligence at a place selected by himself; the personnel of the semaphore stations within the limits assigned for the operations were placed on a war footing, carrier pigeons were distributed among the different stations and vessels, while the small squadrons of torpedo-boats which were under the orders of the Commandants of the “*Défense Mobile*” were ordered to keep as complete a touch as possible with the intelligence bureaux, semaphore and signal stations, &c.; submarine microphones were laid down in a belt outside the harbours so as to communicate the approach of any vessel at night, and telephonic communication was established between the coast batteries, &c. At Toulon, the only port possessing a naval balloon station, the balloon service under the direction of Lieutenant Rageot de la Touche carried out trials night and day, while twelve engineers from the garrison at Nice were also detailed to carry out experiments with the heliograph during the manœuvres.

As the operations were intended solely to test the efficacy of the organization of the coast defence, no Umpires were appointed; they afforded, however, opportunities for the attacking squadron to land men, destroy railways, and bombard unprotected ports. It is the first time that manœuvres of this kind have been carried out in France; the only attempt of a somewhat similar nature was the defence of the port of Toulon, ordered by Admiral Krantz when Minister of Marine. The defence was then entrusted to the marines and land forces, but the experiment did not produce the result expected.

This year the naval forces were alone called upon to protect the coast, and the defence was entirely organized by the Maritime Prefects. The experiment was looked upon with great interest, as it gave the Prefects the opportunity rarely afforded them of exercising military command.

It will be more convenient to follow first the operations against the Mediterranean coast, and then those of the Northern Squadron against Brest, Cherbourg, Havre, &c. Unfortunately only a general idea of what took place can be given, as the reports, even of the special correspondents, are of a decidedly meagre description.

The naval forces which took part in the operations in the Mediterranean were the Active Squadron of the Mediterranean Fleet, under the command of Vice-Admiral Rieunier, consisting of :—

Battle-ships : “Formidable,” bearing the flag of the Commander-in-Chief, “Courbet,” “Dévastation,” “Hoche,” “Vauban,” bearing the flag of Rear-Admiral Buge, “Amiral Duperré,” “Amiral Baudin,” and “Bayard.”

Cruisers (“à batterie”) : “Cécile” and “Sfax,” this latter specially commissioned for manœuvres, and manned by Reservists.

Cruiser (“à barbette”), 1st class : “Jean Bart.”

“Troude.” 3rd class : “Cosmao,” “Lalande,” and

Torpedo-cruisers : “Condor” and “Vautour.”

“Torpedo-aviso” : “Dragonne” and “Dague.”

“Torpilleurs de haute mer” : “Aventurier,” “Kabyle,” “Ouragan,” “Audacieux,” “Téméraire.”

The newly-formed Toulon Reserve Squadron, under the command of Vice-Admiral Vignes, consisting of :—

Battle-ships : “Richelieu,” “Colbert,” “Friedland,” “Redoutable,” and “Trident.”

Coast-defence battle-ships : “Indomptable,” “Terrible,” and “Caïman.”

“Torpilleurs de haute mer” : “Agile,” “Bombe,” “Éclaireur,” and “Orage.”

Transport : “Gironde.”

The “Défense Mobile” of Toulon and the coasts under the command of Capitaine-de-Frégat Bonifay, which consisted of :—

Armoured gunboats : “Achéron,” “Fusée,” “Mitraille.”

“Torpilleurs de haute mer” :—“Capitaine Cuny,” “Capitaine Mehl,” “Chailleur,” and “Déroulède,” and twenty torpedo-boats.

Eight of the latter belonged to the Algerian flotilla, and were temporarily ordered to Toulon, to increase the strength of the “Défense Mobile” during the manœuvres.

For some six weeks previous the active squadron of the Mediterranean was engaged in tactical manœuvres, target practice, attacks on the coast, &c. ; between the 8th and 10th July, scouting operations combined with night attacks on one of the battle-ships, and four accompanying torpedo-catchers were carried out by a small squadron composed of the cruiser “Cosmao,” the “torpilleurs de haute mer” “Aventurier,” “Ouragan,” “Téméraire,” “Agile,” “Orage,” and “Éclair,” temporarily detached for the purpose from the Active and Reserve Squadrons with a division of six torpedo-boats belonging to the “Défense Mobile” of the port of Toulon, the whole under the command of Frigate-Captain Bonifay acting under the orders of Vice-Admiral de Boissoudy, the Maritime Prefect. The squadron

broken up into four divisions proceeded to reconnoitre and search out the coast east and west of Toulon, but although they came into collision with the torpedo-catchers, the latter, thanks to their superior speed, were enabled to escape; neither do the night attacks appear to have been more successful, as on each occasion the torpedo-boats were discovered sufficiently early to prevent surprise.

The Reserve Squadron, under the command of Vice-Admiral Vignes, who hoisted his flag on board the "*Richelieu*" at the end of May, had been similarly employed in drilling and manœuvring, &c.; both squadrons returned to Toulon on the 16th of July, to coal and replenish with stores in readiness for the grand manœuvres; the harbour presenting a fine spectacle, as no less than seventeen battle-ships were lying there fully equipped and ready for sea.

On the 18th of July, the mobilization of the Reservists commenced, who, as soon as they had received their equipment, were placed at the disposal of the Commander of the submarine defences, a certain number being detailed to man the armoured gunboats, and the remaining torpedo-boats for the "*Défense Mobile*" with the transport "*Gironde*," the latter being temporarily attached to the Reserve Squadron to convey to Corsica the materials for constructing a large boom with which to close the harbour of Ajaccio, for which port the Reserve Squadron sailed on the evening of the 20th; during the next few days, in addition to other exercises, torpedo practice, night attacks by the torpedo-boats against the squadron, &c., the men were employed in putting the boom in position, in taking it to pieces, and embarking it again on board the "*Gironde*," the work being carried out on successive days until the men were familiar with the details.

The Active Squadron, under Admiral Rieunier, also proceeded to sea on the evening of the 20th, but anchored in the Gulf of Juan, where it remained until the 26th, landing battalions of seamen with field guns for drill, and exercising the steam and other boats with spar-torpedoes in attacking various ships of the squadrons.

On the evening of the 26th July the Maritime Prefect of Toulon and Vice-Admiral Rieunier received telegrams from the Minister of Marine, directing hostilities to commence at 8 A.M. on the following morning. At 5 A.M. on the 27th all the marine artillery and infantry detailed for service in the coast batteries during the manœuvres quitted their respective barracks and repaired to the posts assigned to them.

The flotilla of the "*Défense Mobile*" was divided into three sections: the 1st consisted of the armoured gunboat "*Achéron*," Commandant de Fraysseix, the "*Capitaine Cury*," and "*Déroulède*," and four 1st class torpedo-boats, with headquarters at Nice; the 2nd of the armoured gunboat "*Fusée*," Commandant Swiencki, the "*Chailleur*," and "*Capitaine Mehl*," and two 1st class torpedo-boats, with headquarters at Marseilles; the 3rd, the armoured gunboat "*Mitraille*," Commandant Bonifay, and fourteen torpedo-boats, with their headquarters at Toulon. For a period of eight days previous to hostilities the whole flotilla had been carefully exercised and the

Reservists trained in their duties. These preliminary exercises had terminated the previous night by an attack on the "Mitraille" by the torpedo-boats, which took place off Sainte Marguerite, at the entrance to the roadstead of Toulon. The object was to prevent the gunboat entering the roadstead, the attempt to do which she had to give up. Although the night was dark, and the torpedo-boats carried no lights, they were well handled, and there were no collisions.

All the semaphore stations were placed on a war footing, and were under the direction of Commandant Lions; the captive balloon also made frequent ascents from the Croix des Signaux, but as the weather was hazy it was difficult to observe anything. The superintendence of the defence of the coast was confided to Capitaine de Vaisseau Rebufat, who took up his quarters permanently at the Croix des Signaux, acting under the orders of Rear-Admiral Romaure, the Major-General commanding the marine forces.

There being no appearance of the enemy, and no information transpiring from the signal stations, at 4 P.M. the "Mitraille" and torpedo-boats put to sea to scout, but returned at dark without having seen anything. Information in the meantime had been received that Nice and Villefranche had been attacked by an ironclad, two cruisers (the "Vauban," "Sfax," and "Lalande"), and two torpedo-boats, after they had first destroyed the signal station at Garoupe and the bridge at Loup; they were, however, driven off by the section of the "Défense Mobile," the "Achéron" chasing the "Vauban," and keeping her under the fire of her two 27-cm. (10-in.) guns for some time. According to the coefficient of strength laid down by the rules between the land and sea forces the enemy were considered to have been repulsed with loss from Nice. About 5 P.M. Admiral Beissoudy proceeded to make a personal inspection of all the measures taken at the entrance to the roads in view of the possibility of a night attack, which, in effect, did actually take place. About 11 P.M. a heavy fire was opened by the enemy's cruisers, presumably upon the electric search lights distributed along the coast. About 1 P.M. the enemy's whole squadron was signalled about 2 miles from Cape Siciè, and as they passed along the ships opened a heavy fire upon the different coast batteries, which replied vigorously. When off the island of Hyères a most dashing attack was made upon them by the torpedo-boats of the "Défense Mobile," the result of which was the most interesting episode of the manœuvres. viz., the placing *hors de combat* of Admiral Rieunier's flag-ship the "Formidable" and the cruiser "Sfax." So beset was the squadron by the torpilleurs that one of them, No. 140, was enabled, by making a circuit, to approach and torpedo the flag-ship and the cruiser before she was perceived. The torpedoes were provided with dummy collapsible heads, so that there might be no question as to when a successful hit was made. Admiral Rieunier himself admitted that his flag-ship would have been sunk, and sent his congratulations to the Officer in command of the torpedo-boat. No serious attempt was made to force the defences, and at 4 A.M. the enemy stood away to sea again. The defence had to acknowledge the loss of torpedo-boats 65 and 68, which, when scouting

from Marseilles the previous evening, were cut off and captured by the "Cécile" and "Cosmao." On the afternoon of the 28th the enemy again stood in, the "Sfax" leading, and attacked for half an hour the battery on Cape Siciè; afterwards steaming along the coast, they bombarded successfully all the batteries between Cape Siciè and Aigle Head, from which it would seem as if Admiral Rieunier contemplated the possibility of shelling the arsenal and naval establishments over the Isthmus of Sablettes. The night of the 28th-29th passed quietly, but some fresh disposition was made of the defence torpedo-boats, six being sent to reinforce the force at Marseilles, which was attacked by the enemy on the 29th; on the afternoon of that day also, in a strong breeze, the captive balloon burst, but fortunately no one was hurt. After the demonstration before Marseilles, the enemy bombarded the small port of Ciotat, but made no further attempt against Toulon itself, then destroying more of the semaphore and signal stations, Admiral Rieunier made another attack on Villefranche; on this occasion the place was considered to have been captured in view of the superior force brought against it by the enemy; but, on the other hand, the defence claimed to have successfully torpedoed the "Sfax," "Jean Bart," and "Cosmao." This brought the first part of the manœuvres to a conclusion, and both the Active and Reserve Squadrons, which latter remained exercising off Corsica, returned to Toulon to coal, &c.

The two squadrons again put to sea at 5 P.M. on the 7th August, leaving the anchorage in single column in line ahead, columns of divisions being formed when outside, the Reserve Squadron soon afterwards standing away to the southward, temporarily parting company with the Active Squadron. No further attempts were made against the coast, and the manœuvres partook for the most part of fleet tactics, the two squadrons acting against each other, and different divisions being pitted the one against another. On the evening of their departure, however, the Rieunier squadron was subjected to a grand attack by the torpedo flotilla from Toulon. Leaving the harbour in the evening, the flotilla, which consisted of the "torpilleurs de haute mer" "Chailleur," "Capitaine Cuny," "Capitaine Mehl," "Déroulède," and twenty torpedo-boats, about 10 P.M. fell in with the enemy off the Hyères islands. There was a bright moon, so that the attacking flotilla were discovered without the use of the search lights; in spite of this disadvantage several of the attacks by the torpedo-boats were successful, two of the battle-ships being torpedoed, while one torpedo-boat was put out of action as sunk. On the following day Admiral Rieunier proceeded along the coast testing the semaphore and signal stations, with the object of ascertaining how quickly orders and information could be communicated to him, and, on the other hand, how quickly reports brought in by vessels scouting could be transmitted to the authorities on land. During the manœuvres carrier pigeons were despatched both from the ships and the shore, while, during the second period of the operations, fresh experiments were carried out at the Crois des Signaux by a second balloon which had replaced the one which had burst.

The semaphore stations seem to have done their work well, Vice-Admiral Boissoudy having been kept thoroughly *au courant* with all that happened along the coast, and he had been able to direct the whole defence from Toulon. The pigeons sometimes carried their despatches well, but, on the other hand, there were several delays. At the termination of the manœuvres Vice-Admiral Boissoudy addressed a letter of thanks to M. Pierre Laure, the President of the Carrier Pigeons Society La Fortereuse, who had placed their pigeons at the disposal of the naval authorities for the manœuvres, in which he bears testimony to the valuable work done by the carrier pigeons of the Society, and to the patriotic zeal displayed in organizing so valuable a service.

On the afternoon of the 9th Admiral Rieunier's squadron anchored off Saint Tropez, and, reinforced by six torpedo-catchers and "torpilleurs de haute mer," prepared to defend the roadstead against an attack by the Reserve Squadron; mines were laid out, and other preparations made. Soon after 8.30 p.m. the cruisers which had been scouting returned and reported the appearance of the enemy, who were soon discovered off the entrance by means of the search lights, but, except for a heavy cannonade between the two squadrons, lasting over an hour, it does not appear that any serious attempts were made on the anchorage. The next day the operations came finally to an end by a grand sham fight between the battle-ships of the two squadrons. Both fleets joined company in the morning, and were divided into three divisions, two of which manœuvred against the third; here again, unfortunately, all details are wanting as to what took place and the results; the cruisers were employed keeping up communication with the shore between the defending squadron and the semaphore station at Cape Martin. At the conclusion the ships returned to Toulon, and the Reservists were discharged on the 13th August, after having been embarked twenty-six days.

We will now turn to the operations of the Northern Squadron, of which we have somewhat fuller details, as the special correspondent of the "Temps" gives a slight description of the nature of the defensive works of the two great ports of Brest and Cherbourg, and also glances at their weak points.

The attacking fleet in the north was the Northern Squadron, under the command of Vice-Admiral Lefèvre, and consisted of:—

Battle-ships: "Suffren," flag-ship of Commander-in-Chief,
"Victorieuse," flag-ship of Rear-Admiral Barrera.

Coast-defence armour-clads: "Requin," "Furieux," "Fulminant," and "Tonnerre."

Cruiser ("à barbette"), 2nd class: "Rigault-de-Genouilly," specially commissioned for the manœuvres by Reservists.

Cruiser ("à barbette"), 3rd class: "Surcouf."

Torpedo-cruiser: "Épervier," "Wattignies."

"Torpedo-aviso": "Lance," "Salve."

"Torpilleurs de haute mer": "Défi," "Alarme," "Turco," and "Veloce," specially commissioned by Reservists, and attached to Northern Squadron for manœuvres.

The "Défense Mobile" at Brest consisted of:—

Coast-defence armour-clad: "Tempête" and nine torpedo-boats.

At Cherbourg:—

The coast-defence ironclads: "Tonnant," "Vengeur."

Armoured gunboats: "Cocyte," "Flamme," "Grenade," and fourteen torpedo-boats, to which were added two from Lorient and Rochefort.

The mobilization began on the 18th of July, the semaphore and look-out stations along the coast were put on a war footing, and the coast batteries manned. War, however, was not supposed to be declared until the morning of the 26th, the interval being employed both by Admiral Lefèvre's squadron and the defending forces in preliminary drills, reconnaissances by day and night, and generally testing the means of defence, including the submarine microphonic apparatus, which was laid down off the harbour's mouth to signal the approach of vessels at night; the search lights, both from the ships and shore stations, were also practised. The evening of the 25th was unfortunately marked by the loss of one of the torpedo-boats. The "Tempête" and her flotilla had put to sea in the morning to make a reconnaissance and exercise the semaphore stations; when approaching the harbour on their return about 10 p.m., the torpilleurs of Admiral Lefèvre's squadron were ordered out to reconnoitre the approaching vessels; both sides employed their search lights. Confused by the blinding glare from the "Tempête's" light turned full upon her, No. 76 ran across the ironclad's ram, and was so damaged that she sank almost immediately; all the crew were fortunately saved, although two stokers were badly scalded by the steam as the boiler blew up; the "Tempête" at the time was steaming about 6 knots.

The Northern Squadron put to sea from Brest at 6 a.m. on the 26th July, in splendid weather, to carry out a similar programme to that of the Mediterranean Fleet, the first part of the operations being confined to attacks on this harbour only. The "Défense Mobile" was under the orders of Captain Motet, of the "Tempête"; the torpedo-flotilla quitted their anchorage at the entrance of the military port, and were distributed in the numerous creeks which abound on that coast, in readiness for seizing any favourable opportunity to attack the enemy.

Brest is admittedly one of the strongest of the French arsenals; its natural advantages are very great; the approaches, bristling with small islets, reefs, and rocks, are dangerous for an enemy; the surrounding coast, broken up into deep bays, is particularly favourable for the "Défense Mobile," as torpedo-boats can lie concealed completely out of sight of hostile vessels; the cliffs are high and permit the look-out men to sweep the sea horizon in all directions, while the channel narrows at the entrance to a width of only 1,500 yards. Naturally, a considerable divergence of opinion exists between the Officers of the Navy and those of the land forces as to the impregnability or otherwise of the place. Many of the Naval Officers hold

that in spite of the batteries and mine-fields it is quite possible for swift ships to rush the channel and destroy the town and dockyard; artillerymen, on the other hand, while admitting that ships might pass one or two of the forts, consider it impossible for them to run the gauntlet of all; this is a question which cannot, of course, be settled by any peace manœuvres such as have taken place, the object of which has been to test the working order and efficiency of the mobile and shore defences, and in this respect the results have been considered highly satisfactory.

A little before midnight on the night of the 27th-28th Admiral Lefèvre made his first attack. The "Tempête" had taken up her station in the centre of the channel on a line between Point St. Mathieu and the Point of Toulanguet; two torpedo-boats were also stationed off each of these points, while the remainder of the flotilla was formed in two divisions, of which the one, distributed between the two sides of the channel, occupied on the north the small bays of Mingan, Elec, and Ste. Anne, and on the south lay concealed in the indentures of the coast of the Island of Roscanvel, the points of Kervinion, Cornouailles, and Robert; while the other division took post in the Bay of Bertheume, completely masked by the fort and point of Creachmeur. The night was extremely dark, but all the search lights between Minon and Cornouailles Points were in readiness. Towards 11.30 P.M. the microphonic apparatus, which, as before mentioned, was laid out in the form of a belt some two miles outside the entrance, signalled the alarm, and the search lights soon discovered the approaching enemy. The defending torpedo-boats immediately began to harass the hostile ships, and, although attacked in turn by the torpedo-catchers, they were enabled to find refuge in-shore, from whence they returned again and again to the attack. The enemy succeeded in forcing his way into the channel, and the "Tempête" was compelled to fall back on the inner port, but in actual war it is almost certain that no ships could have penetrated further without being destroyed by the powerful guns of the land batteries, not to mention the mine-fields, no attempt to remove or destroy which was made. The whole channel was lit up as bright as day by the numerous electric search lights placed on the different points, on the Minou lighthouse on the north side of the entrance, on the battery of the Capucins on the Isle of Roscanvel, on Point Delec, Fort Robert, &c., and even if the first lights from their position had been destroyed by the enemy's fire, the others in more protected stations could still keep the whole channel illuminated. Not only are heavy guns now mounted on the summits of the different promontories, but every creek has its concealed battery, and as the guns are mounted but little above the level of the water their concentrated fire, even on an ironclad steaming at speed, would have a terrible effect, and the damage would be done almost before the ship would be aware of their existence; neither would it be possible for a ship to stop and attempt to engage any single battery, as in that case she would be brought under a concentrated fire from both sides of the channel. At 1.30 A.M. Admiral Lefèvre gave up the attempt

to force his way further, and signalled that he considered himself beaten.

The following day the attack was renewed about 11.30 A.M., in broad daylight. As a spectacle the whole *coup d'œil* was very effective as the fleet, in column of divisions in line ahead, advanced up the channel towards the harbour, opening a heavy fire on the forts on each side as the ships passed, which was returned with equal spirit from the batteries; but it is certain that no hostile ships could penetrate so far up the channel, as even if they had silenced the whole of the lower batteries and cleared a way through the mine-fields, which is very doubtful, they must succumb to the plunging fire to which they would be subjected from the heavy guns mounted on the heights of the Capucins and Toulbroch, to which no reply from a ship could be made, neither is it likely that these works could be silenced by bombardment from the sea. At 2 P.M. the battle ceased, and both attacks on Brest may be considered to have completely failed. Admiral Lefèvre anchored his squadron for the night in the Bay of Douarnenez, the battle-ships lying with their Bullivant steel nets out to guard against the attacks of torpedo-boats. Such an attack took place about 10 P.M. by seven torpilleurs of the "Défense Mobile," which, aided by a light fog, were enabled to approach within range and torpedo the torpedo-cruiser "Épervier," before they were either detected, any search light turned on them, or fire opened.

The next morning Admiral Lefèvre weighed and destroyed the torpedo station at Morlaix, which brought the first part of the operations to a conclusion, hostilities ceasing at midday.

The second series of the manœuvres began on the 7th August, the scene of operations being the coast of La Manche, bounded on the west by Cape La Hague, and on the east by Point d'Ailly, which includes the great commercial port of Havre and several smaller ones. As Cherbourg is the military port most exposed to a bombardment from the sea, it was desired to test the improvements introduced into its system of defence by the new works commenced in 1890. The flotilla of the "Défense Mobile" at Cherbourg is stronger than at any of the other ports, including, as it does, two of the coast-defence ironclads and three armoured gunboats. As at Toulon and Brest, all the measures for the defence were entirely in the hands of the Maritime Prefect, Admiral Lespès.

The last act of Admiral Lefèvre, at the conclusion of the first part of the manœuvres, had been the destruction of the small torpedo station at Morlaix, where an old wooden ship, the "Obligado," serves as a workshop and dépôt. The place is practically undefended, the old castle of Taureau, which formerly guarded the port, being only armed with obsolete guns: there is nothing to prevent the landing of a force, as only a regiment of infantry, without artillery, form the garrison, and, in case of mobilization, its place is on the frontier with the rest of the 10th Army Corps. It would also be difficult to mass troops in the event of its being necessary to take steps to repel a landing on the Brittany coast, as the railways are absolutely insufficient; from Rennes to St. Brieuc and from Guingamp to

Kerhuon, that is to say, Brest, there is only a single line, and yet it is by that route that the territorial artillery would have to be brought from Rennes, just at the time when mobilization towards the east will render the working of the railways most difficult.

Bretagne is, however, but indirectly threatened. However valuable the possession of Brest may be, serving, as it would, as a place for victualling and shelter, it would not be an indispensable base for operations by the enemy. The occupation of Cherbourg would be much more useful to him, as it is within reach of Havre and the mouth of the Seine, that is to say, Paris. Cherbourg and Le Cotentin in the hands of the enemy would mean the annihilation of the national defence.

The manœuvres have been of considerable interest, as showing, without doubt, that Cherbourg, "that nest of bomb-shells," is less threatened from the sea than from the land. The danger will arise from the surrounding heights, which are very imperfectly fortified.

The defence of the harbour and arsenal is not so impossible as has been supposed. Of course we are far removed from the time when the breakwater was the only absolute protection. Steam allows of an entrance into channels without tacking: therefore these channels are now too broad. The breakwater is only about 2 km. from the military port, and 5 from the commercial, and modern guns carry a distance of 10 or 12 km.: but works are now in progress to narrow these channels by uniting the isle of Pelée and the fort of Chavagnac by means of breakwaters; as to the distance of the large breakwater, it must not be forgotten that it is fortified, and will shortly be completely rearmed with modern heavy guns, which will keep the enemy at a distance sufficiently far to prevent his being able to fire with accuracy. We can imagine what the 3,606-yard-long breakwater may become when well armed; in spite of the power of the projectiles of the present day, days of bombarding will be necessary to silence it, and, considering the price of modern projectiles, an enemy would recoil from such an enterprise; it must, therefore, be strongly fortified, after the fashion of the mortar batteries erected at the foot of the old forts of Vauban and Napoleon, which cover the access to the channels.

On the other hand, we can do nothing against an attack which had for its object the capture of Cherbourg from the rear. The harbour of La Hougue, which faces the Seine, and especially the small bay of Vauville, which faces the islands of Normandy, are not fortified. In case of an unexpected declaration of war, when the active troops will already be marching eastward, a strong squadron could easily throw on shore a body of men who, in half a day, would be able to reach the heights above the town, take the fortifications in reverse, and destroy Cherbourg and the arsenal. Caen, Rouen, Havre, and, consequently, Paris, would all be threatened.

We are looking at things in their worst light; it is to be hoped that the Cherbourg flotilla would be strong enough to frustrate any such attempt; but still a landing of this sort is quite within the bounds of possibility. In considering the question of the defence of

this part of the coast, the most urgent work seems to be the defence of Cotentin, and this could be done at but little cost. An enemy wishing to land is not likely to have siege material with him, and, therefore, it is not necessary to have here a fortress on the scale of those on the line of the Meuse. Good strategical roads, shelters for a few guns, redoubts overlooking the bays where a debarkation can be effected, railways allowing of the quick transport of reinforcements, and the construction of a few simple forts within a radius of 1 or 2 leagues of Cherbourg, would suffice. Cotentin, in reality, is only a peninsula adjoining the narrow isthmus, less than 10 km., between St. Sauveur de Pierrepont and Port Bail. An arm of the sea at one time covered all this country; little by little it has receded, and a vast marshy valley has been formed, through which runs the Dauve. Without the sluices, erected at Caranton, this immense valley and that of Taute would again be covered by the sea. Napoleon began a canal to connect the sea at Caen and that of Jersey, so as to avoid the trouble of doubling the Capes of La Hogue and La Hague, but the project was abandoned. It ought to be possible to work the sluices so that this low country may be inundated if necessary, as can be done at Dunkerque; the country is then impracticable, save by the isthmus of Port Bail, which should therefore be strongly held. It ought to be possible by the railway, at the first alarm, to occupy all the country between Port Bail and the promontory called Nez-de-Jobourg. The hills of Flamanville should serve as a base for a corps of observation charged to prevent any disembarkation towards Carteret, or the Bay of Vauville; on the opposite side of La Hogue the new batteries of St. Vaast protect the great roadstead; but it would be well to have on the height of Montebourg a post of observation. Thus secured, Cotentin ought to be a large entrenched camp, inaccessible to an enemy who had disembarked, and would serve as a protection to Cherbourg from its principal danger, viz., an attack in reverse.

It is a matter for regret that the land forces have not taken part in the operations. It would have been most useful to have seen how quickly troops could be sent to points menaced by a disembarkation of an enemy. It is true that there are no field artillery or cavalry attached to the garrison of Cherbourg, but this grave want could be remedied by sending part of the territorial regiment of artillery and some squadrons of cavalry from Rennes, and, from this point of view, the question may well be asked if that town is the most convenient centre for the assembly of the forces, whose duty would be, above all, the defence of Cherbourg. The questions raised by the manœuvres are very grave: they touch the vital interests of the country.

The 7th passed quietly at Cherbourg; the "Tonnant," "Vengeur," and torpedo-boats being sent to scout for traces of the enemy. Rear-Admiral Mathieu, Chief of the Staff of the 1st Arrondissement, took up his post in the morning at the fort of Roule, which was made the headquarters of the defence during the operations. This fort and some other old redoubts, although now not armed, from their position on the heights overlooking the roadstead, form excellent posts of

observation. From the fort a fine bird's-eye view of the whole grand military port is obtained. The town, the roads, the ships, the enormous breakwater, the insular forts of Chavagnac and Pelée Island, those of Querqueville and the Flamands, which complete the maritime *enceinte*, all stand out with the distinctness and precision of a plan in relief. It is easy to understand that the weak point of the defence is the stretch of deep sea between Pelée Island and Cape Levi, called the Roads of Grumes. These roads could be easily occupied by an enemy's squadron, and from there he could enfilade all the defences of Pelée and of the breakwater. It is in order to remedy this danger that the pass between Pelée and the coast is to be closed by a breakwater, which will be powerfully armed, and that at the foot of the heights on a level with the sea powerful mortar-batteries are to be placed, designed to pour a plunging fire upon hostile ships which may take up a position in this roadstead.

A little after midday a telegram was received that the squadron had passed some distance off Cotentin, in sight from the semaphore at Ailly, near Dieppe. If the enemy had Cherbourg as its objective, he might be sighted about 5 p.m. Should Admiral Lefèvre, however, pass the estuary of the Seine, he would probably be intending to make a demonstration against Havre, and to destroy the coast defences and semaphores before appearing against Cherbourg. Admiral Lespès had foreseen this, and detached the armoured gunboats "Flamme," "Grenade," and "Cocyté" to share in the defence of the great commercial port. This rich city would, in time of war, offer a strong temptation to an enemy to attempt to destroy its wealth, and to levy a heavy contribution upon the town. Some years ago the defences were strengthened, and it is proposed now to erect some new batteries similar to those in the Brest Channel and at Cherbourg. In addition, the estuary will afford a good shelter for the torpilleurs and gunboats, which will be a powerful aid to the shore batteries. The demonstration of Admiral Lefèvre will have for its result to make known the exact values of the fixed and mobile defences, and to indicate the weak points of the organization. According to the reports from the semaphore stations, Admiral Lefèvre proceeded methodically. He bombarded the stations at Entretat and Cape Antifer, after passing before Fécamp, without disturbing that port. The semaphores destroyed, he was able to arrive before Havre without being signalled. At 1 p.m. the semaphore at Octeville telephoned to Havre that the enemy was in sight, about 15 miles north of La Hève, and steaming rapidly towards Havre. At 2.30 the vessels of the "Défense Mobile," which had been scouting all the morning outside, came into action with the enemy, but, being much inferior in force, they had to fall back under protection of the guns of the batteries, which opened fire about 3.30 p.m.; the squadron made no attempt to force the harbour, and, ceasing fire a little after 4 p.m., stood away out of range.

The batteries were manned by the men of the 11th Regiment of Artillery and of the 1st Fortress Battalion, which were mobilized for the purpose, and occupied the batteries of Floride, Huguenots, Epi-à-Pin, Hève, and Frascati.

The night passed quietly, both at Havre and Cherbourg, and, as it was quite clear, with a bright moon, it did not offer a favourable opportunity for the vessels of either side to attempt a surprise.

The next day, the 8th, it was expected that the enemy would attack Cherbourg; the various semaphore stations between Trouville and the Point of Cotentin signalled them as they passed up the coasts, and for a short time they were in sight from Cherbourg itself, but about 11 A.M. a heavy fog set in, obscuring everything; in the afternoon, when the fog lifted, however, they turned off and bombarded some of the forts between La Hogue and Havre; in the evening it was signalled that they had anchored off La Hogue, which is the only anchorage from Cotentin to the mouth of the Seine where vessels can lie sheltered from the west winds; the holding ground is excellent, and it lies about 2 miles to the southward of the fortified island Tatihou. Immediately on the receipt of the information, Admiral Lespès determined to disturb them, and six torpedo-boats, under the orders of Capitaine de Frégate Ingouf, were despatched for that purpose; about 11 P.M. the small squadron approached within range, but the hostile ships were keeping a sharp look-out, and their search lights swept the sea, the powerful rays crossing each other in all directions. The torpilleurs were discovered, almost immediately, and the fire of the Hotchkiss guns directed against them; under these circumstances, and as there was, in addition, a bright moon, the attack must be held to have failed; it is, however, only fair to state that the torpedo-boats claimed to have torpedoed the "Requin" and "Furieux." The struggle lasted a little over an hour, and Commandant Ingouf and his flotilla reached Cherbourg again about 2.30 the next morning; the enemy quitted their anchorage a little before 10 A.M., and were soon signalled as steaming towards Cherbourg. The weather was very suitable for a surprise; it had rained hard part of the morning, dark and lowering clouds hung over La Manche, sometimes so thick as to hide the sea. Towards 11, the "Tonnant," with the small squadron of torpilleurs, under Commandant Ingouf, left the harbour by the Eastern Channel, the "Vengeur" remaining in the harbour ready to move when required; the batteries were manned ready to open fire; soon the rain began to fall in torrents, hiding everything, but at noon a breeze sprang up, clearing away the mist, and the enemy was discovered, with the "Suffren" leading, steaming towards the Eastern Channel. All the batteries and the coast-defence ships opened fire upon them, but the hostile ships continued to advance without returning a shot; at 12.15 a cloud of smoke belching from the "Suffren's" battery was a signal to the rest of the squadron to open fire, in turn, upon the defenders, and the action then became general. The squadron presented a fine sight as they defiled in line ahead past the breakwater, half hidden at times in the smoke which hung heavily about; in war, the new smokeless powder will give the defence a marked superiority over the attack, as the ships must always remain full in sight, while the batteries will be invisible.

The torpilleurs formed in line under shelter of the forts between Querqueville and Chavagnac awaited the moment of attack; at 12.30

the "Suffren" reached the extreme end of the breakwater, and Commandant Ingouf launched his flotilla upon the hostile ships, supporting their attack by the "Tonnant"; they were immediately perceived and the quick-firing guns from the tops of the battle-ships opened upon them, while Admiral Lefèvre, in turn, ordered his own torpilleurs forward to attack, and whatever else may have happened, it is certain that several of these little craft in a real struggle must have been sunk; as it is, their swift movements to and fro brought into greater prominence the stately movements of the big ships; the spectacle had a severe beauty of its own—forts, breakwater, ships, and torpilleurs seemed to float in the smoke as the breeze drove it over the sea and hills. The enemy, instead of penetrating by the Eastern Channel, found himself unable to maintain his position in face of the overwhelming fire from the forts, and stood out to sea again, followed by the torpilleurs, which kept up the chase, until the fog settling down again, his ships disappeared under its shelter, and the small craft returned to the harbour.

Admiral Lefèvre renewed his attack again after dark; he was favoured by the night, for the moon was obscured and the heavy clouds hung low over the sea; it blew fresh from the north-east and there was a choppy sea. From the time it became dark, the electric search lights on the land were sweeping the roads and open sea, while the "Tonnant," "Vengeur," and torpilleurs were scouting outside.

Soon after 9 the enemy were discovered off the entrance to the Eastern Channel; the vessels of the "Défense Mobile" were driven in, pursued by the squadron which soon arrived within one of the zones of light, when the forts immediately opened fire upon them; the western batteries, Sainte Anne and Querqueville, placed within the luminous radius of their search lights, could see and fire upon the squadron, but on the north front, the batteries being between several of the streams of light, the gunners could see nothing and vainly strove to lay their guns, but were unable to fire. The squadron made a direct attack upon the breakwater, steaming along it towards the east; all the guns of the immense mole were in action; the red flashes and the clouds of smoke stretched over a line more than three miles long; the rays from the search lights formed a phosphorescent band, in which the smoke rolled itself into fantastic clouds. The squadron used their search lights but sparingly; a ray of light occasionally streamed for an instant over sea, breakwater, arsenal, and the heights of Octeville and Roule and then disappeared. The bombardment attained its height at about 10.15, and continued until 11 P.M., when the enemy again stood out to sea for the night, leaving it uncertain whether they would make another attempt against Havre on the morrow or once more try to force the entrance to Cherbourg. In the morning a red flag hoisted on Fort Roule announced to the forts and the "Défense Mobile" that the enemy was in sight; all the morning they remained at sea out of range but in sight. The "Tonnant" and "Vengeur" remained under shelter of the breakwater, while the torpilleurs cruised in the channels. Towards 3 P.M. the squadron

once more stood in towards the western entrance, opening fire upon the forts of Nacqueville, which was immediately returned. The "Vengeur" took up her station at the entrance and opened fire upon the "Suffren," which was leading, and soon from all the batteries heavy clouds of smoke began to rise. The "Tonnant" steamed towards the Eastern Channel, but the water was too low for the squadron to attempt to force that entrance before night, and the attempt had to be made by the west. The attack was fine spectacularly, as the ships came entirely into sight firing upon the defences; it blew from the north-east and the sky was cloudy, but the day was not so dismal as the previous one. The "Suffren," preceded by a despatch-boat, passed majestically before the end of the breakwater, followed by the rest of the squadron, and attacked it in front; its guns replied, and then the eastern forts, in their turn, took up the fire. The "Tonnant," advancing to open fire, managed to place herself in the way of the forts of Flamands and Tournalville, which, consequently, were reduced to silence; at 4 P.M., when every one was expecting to see him attempt the Eastern Channel, Admiral Lefèvre gave it up, the "Suffren" altered her course to the north and, followed by the squadron in two divisions, steamed seaward again. The attack had failed, but the squadron still remained in sight. No further attempt, however, was made, and at sunset the hostilities came to an end and the manœuvres were finished.

The reports of the Admirals and Maritime Prefects have not, as yet, been made known, but it is possible without them to draw a few general conclusions.

It is difficult to draw comparisons between the two series of manœuvres, not merely because the naval forces in the Mediterranean were far stronger than those in the north, but also because the zones of operations were very different. In the north a tidal sea runs strongly, the coast is a dangerous one, the currents strong and uncertain, and shipwrecks are frequent; on the other hand, the bays, estuaries, and numerous small roadsteads, closed by small islands, offer everywhere concealed places of refuge to torpedo-boats; at the same time an enemy might be able to push his light vessels nearly to the heart of the Armorican Peninsula; it is true the destruction of the railways would be difficult, as they lie well back from the coast; and if Méangon, Guingamp, and Morlaix are protected from a *coup de main*, the war, save in the case of an attempted landing, must be an essentially maritime one, as there are no objects of attack for a squadron, land defences existing only at the great ports.

In the Mediterranean there is no tide, no estuaries, the coast is nowhere deeply indented, the harbours and towns, with scarcely any exceptions, all face the open sea. Cette, Marseilles, La Ciotat, Antibes, Nice, Menton are all exposed to insults from an enemy. In addition, the points where a landing can be effected are numerous: Port-de-Bouc, La Ciotat, Bandol, Cavalaire, Cannes, the Gulf of Juan, are all points where a landing can be easily effected. Thus on the 22nd July, Admiral Rieunier at 6 A.M. landed two battalions of seamen, two field batteries, with squads of miners from the torpedo-

boats under cover of the guns of the fleet on the shore of Jouan-les-Pins, and moved them on Antibes. The question is, are the mobile land forces in a position to oppose such attempts? This has never been tested, and the fact is much to be regretted. But one fact is certain; it is that, in the Mediterranean this defence is pretty nearly condemned to remain helpless, because the coast railway is directly exposed to attacks from a squadron. From the tunnel of Nerthe to Marseille, from La Ciotat to Toulon, from Saint Raphael to the frontier the railway runs either along the coast or on the side of the mountains, and the bridges and viaducts can all be destroyed from the sea by any vessel keeping at a distance of 10 km. Thus Admiral Rieunier repeated the classic operation of destroying the viaduct of Bandol, the finest of the works connected with the railway, and also the bridge over the Var. It is a matter of congratulation that a third line of rail has been provided to the southern railways of France. The line Draguignan—Grasse—Nice and that of Digne—Paget—Théniers—Nice ought to be able to supplement a little the great coast line. It would be well from this time to look upon these lines as the real strategic railways of the Mediterranean, and consequently to improve the junctions towards Meyrargues, Gardanne, and Cannes. The only point common to the two zones of the manœuvres was the presence on the sea-board of two important commercial towns. Havre in the north and Marseilles in the south are both tempting preys for an enemy.

To judge from the operations, Admiral Lefèvre failed against Havre, but as the dispositions of the land forces for the defence were supposed to have been studiously kept secret, and as his squadron was small, and he could not be aware of the numbers of the forces concentrated to resist any attempt at landing, it is scarcely to be wondered at that he forbore to essay a landing, and contented himself with doing what damage he could by a bombardment. Admiral Rieunier, on the other hand, was successful against both Marseilles and Nice, in spite of the fortresses which cover them. Havre is less well defended by the forts of La Hève than Marseilles by those of Pomègue and Ratonneau; there is, it is true, the shelter afforded to the “*Défense Mobile*” by the Seine, but the haven of Pomègue is also a shelter, so the results are contradictory.

With reference to the “*Défense Mobile*,” it also proved itself stronger in the north, Admiral Lefèvre having recognized that on different attempts he was repulsed by the torpedo-boats as much as by the land batteries, while in the Mediterranean the torpilleurs suffered heavily, although they achieved one notable success, viz., the placing *hors de combat* of the “*Formidable*” and the cruiser “*Sfax*,” still, on the whole, Admiral Rieunier was successful: he captured Villefranche and the Hyères Islands, besides the destruction of the torpedo-boats in the Gulf of Saint Tropez by the “*Cécile*” and “*Cosmao*.” In the north the squadron only achieved a success against the torpedo-boats in the actions at Morlaix, and at the roadstead of La Hougue. But these two results should inspire grave apprehension, and ought to lead to a prompt improvement of the shore defences, as these are

the two places from which Brest and Cherbourg can be threatened in reverse. It is necessary, therefore, to guard against such eventualities by constructing fixed defences to cover these landing places, and still more to reorganize the territorial troops, so that they may be in a position to replace immediately the regular forces and marines on the outbreak of war. We know that it is considered sacrilege to touch on the organization of the Army, but it seems to us that in the local gunners at Lille, and in the territorial chasseurs, there is an excellent model to follow for developing a coast defence. It is necessary at any cost to appropriate for this defence all the territorial elements to be found on the coast. The superabundant maritime "Inscrits" would form excellent companies of riflemen and gunners, and strengthened by the territorial infantry and artillery might be depended upon to do excellent service. It could be admitted then that any landing or, at least, effective occupation of any point of our coast would be impossible.

There yet remains the danger of night attacks on the coast by ships aided by their search lights. Measures ought to be taken to increase the number of the search lights on land, or even to render them mobile by means of light railways. On various occasions we have seen batteries reduced to silence for want of these electric lights, and every battery ought to be provided with them. All the manœuvres since 1886 have shown that these lights are a most valuable addition to the means of defence of our coasts.

Such are some of the general considerations suggested by the manœuvres. There still remains for study the question of the semaphore stations; to prove their efficiency was one of the objects of the manœuvres, to destroy them the squadrons passed up and down the coasts. We hope before long to be able to speak of what changes may be necessary.

THE FIELD GUN OF THE FUTURE.¹

By MAJOR E. LAMBART, R.A.

THE question of the field gun of the future is exciting almost universal attention at the present time among Continental military authorities, who are all agreed at least on one point, viz., that the limit of the power of field artillery has by no means been reached at present.

Our own 12-pr. B.L. gun, which has been so confidently described by high civilian authority as "the best field gun in Europe," finds few admirers among foreign critics, and, as is well known, is not much loved by our own battery Commanders. Perhaps more than any other nation in the production of new weapons we lose sight of the adage, "*L'inventeur est le serviteur du combattant.*"

In view of the more general interest taken nowadays by Officers of each arm in things pertaining to the others, a *résumé* of the writings on the subject of the future field gun which have recently appeared in French, German, and Russian journals may be worthy of a place in the pages of the United Service Institution Journal. By far the most important of these writings are the long and carefully argued essay entitled "*Das Feldgeschütz der Zukunft*," by the German General R. Wille, and the pamphlet by M. de Nordenfelt, "*Notes sur l'Artillerie de Campagne à Tir Rapide.*"

General R. Wille is an Officer of established reputation in the German Army, the author of many valuable essays on field artillery subjects during the last twenty years.

M. de Nordenfelt is a writer of equal weight and authority as regards the designing and invention of artillery "*matériel.*" The other papers referred to at the head of this article are criticisms more or less elaborate of the views advanced by Wille and Nordenfelt.

General Wille's proposed gun, as will be seen, is put forward not only as the most powerful gun that can be devised to satisfy the conditions of a field gun, but as the only and universal weapon for field artillery in the future, under all the varied conditions of the employment of horse and field batteries.

M. de Nordenfelt believes in the necessity for field mortars and howitzers as well as field guns, and in a separate pamphlet lays down the conditions for the latter class of weapon on the quick-firing principle.

¹ "Notes sur l'Artillerie de Campagne à Tir Rapide."—De Nordenfelt. 2. "*Das Feldgeschütz der Zukunft.*"—Von R. Wille. 3. "*Artillery Journal, Russian,*" March—June, 1892. "*Invalide Russe,*" ditto. 4. "*Revue d'Artillerie.*"—Capitaine Moch.

It will be convenient to take the ideal guns of Wille and Nordenfelt separately, as they differ very widely, and each author supports his proposals by arguments of great length.

Proposed Gun of General v. Wille.

The following are its principal dimensions :—

Weight of gun alone, 7·75 cwt.
 „ shell, 14·3 lbs.
 „ powder charge, 3 lbs. 5 ozs.
 Length of gun, 9' 2".
 Calibre, 2·756".
 Initial velocity, 2,625 ft.-sec.

General Wille's Gun.—It must be confessed that General Wille's ideal gun of the future is sufficiently startling in all its aspects, and even if such a gun, when built, fulfilled all the expectations he has of it, its monstrous length of 9 ft. 2 ins. would secure its rejection by all but the most infatuated theorists. The following is a brief *résumé* of the General's arguments :—

Weight of Shell.—The weight of his shell is based on the average weights of the existing German shells, shrapnel, and common. He looks forward to the adoption in the near future of a uniform weight for shells of all kinds, and considers that a shell of 14·3 lbs., even with his proposed reduction of calibre to 2·75 ins., would meet all the requirements of strength and interior space for bullets and powder.

Calibre.—General Wille's choice of calibre is also determined by taking averages, not in this instance of German guns only, but of the principal existing field guns of European Powers. Since the weight of shells for field guns, he says, is permanently settled within narrow limits by considerations of portability, &c., we must look to a reduction of calibre, and consequent increase of powder pressure in the bore, as a means of increasing our *initial velocity*.

Initial Velocity.—The increase of initial velocity (I.V.) is the General's *summum bonum*. He will hear of nothing against it, and, as will be seen hereafter, sacrifices everything to it.

After tracing the gradual increase of I.V. through the history of modern artillery progress, he boldly asserts that we have no reason to doubt the possibility in the near future, with the improvements in materials for guns and the future development of new powders, of obtaining an I.V. of 2,500 to 3,000 ft.-sec.! As to the general principle of the desirability of such, or, indeed, any further increase, he replies as follows to the usual arguments on the other side :—

“ The I.V. already obtained is such as to give us sufficient remaining velocity (R.V.) against ‘ personnel ’ at all practical ranges, to give us also a sufficient cone of dispersion of shrapnel bullets, and a sufficiently deep danger zone of shrapnel fire. Increase of I.V. leads to a diminution of the *cone of dispersion* of the bullets, which

necessitates an increase in the *number* of bullets, and a consequent lessening of their weight." To this Wille replies that, in view of the progress of infantry tactics, it is imperatively necessary to increase the range and danger zone of shrapnel, which can only be done by an increase of I.V.

"The increase of range beyond the power of possible observation of effect is quite useless, and only leads to waste of ammunition. The present guns carry quite far enough." To this the General retorts that batteries must be supplied with more powerful field glasses! History tells us that the I.V. (and consequent range) of field guns has always been kept far in advance of that of infantry rifles, and the recent great increase in the range of rifles entails an increase in the shrapnel range of our guns.

With I.V. of 2,600 ft.-sec., he maintains that shrapnel range will be increased to $4\frac{1}{2}$ miles!

"Very flat trajectories, the result of very high I.V., are useless against troops behind cover, the angle of descent being so small."

The General says that, as far as that goes, the trajectories of the present guns are too flat for that purpose, and that it would be better to trust in the future to common shells charged with high explosive powders (such as melinite, &c.). It would be absurd to sacrifice our shrapnel fire against troops in the open to a desire to obtain the effects of curved fire.

"Remaining velocity (R.V.), which is the really important point in a field gun, does not increase in anything like equal proportion to the increase of I.V."

Wille replies that past experience points to a very large increase of R.V. at least with increased I.V., and quotes tables of existing and former guns to prove that guns of the present day have the same R.V. at 2,000 yards that the old guns had at 600 yards. He maintains that his proposed gun will compare with the present guns in R.V. as 6:3.

"A gun with such enormous I.V. will require an impossibly heavy carriage to stand its recoil."

Admitting the gravity of this objection, General Wille proposes to build his carriage in two separate parts, and to check the wheels by very strong spring brakes.

Accuracy.—Admitting that there has been no very great increase of accuracy as regards "direct hits" since the introduction of rifled guns, General Wille combats the idea that the accuracy of shrapnel is injuriously affected by the increase of I.V. owing to the inaccuracy of time fuzes. This, he maintains, is compensated for by the increased space covered by the bullets of shrapnel with greater R.V., and he claims for his proposed gun an increase of length of "probable rectangle," as compared with the present German guns, of

At 1,000 metres,	99 metres or	325 yards.
" 2,000	" 24	" 78 "
" 3,000	" 8	" 26 "

Number of Kinds of Projectiles.—In considering this question Wille

deals with four projectiles, common shell, shrapnel shell, case shot, and a shell charged with one of the new explosives, which, for want of a better name in our service, may be called a "battering" shell.

Shrapnel he gives the palm to as the "queen of shells," and with this opinion no artilleryman is likely to quarrel.

Battering shells already exist in different experimental forms in the French, German, and Austrian Armies. Their principal defect at present is that, as their bursting charges are of some kind of almost smokeless powder, they cannot be used for ranging purposes; in fact the range must be found with other projectiles before using them. When military chemistry has remedied this defect, General Wille would equip his gun of the future with only two projectiles, shrapnel and battering shells.

Against case shot he declaims in thirty pages of facts, figures, and inferences, which are briefly referred to below:—

"Case shot," says Wille, "was the own sister of round shot—together they gained honour and glory—together they may be buried without regret." Throughout the Franco-German war of 1870 only 0·12 per cent. of case shot were expended by the Germans, and for this result they dragged with them 54,270 kilos. (over 3 tons) of dead weight, and there was no single instance of case shot doing what could not have been done by common shell or shrapnel! Against infantry it is useless, as a battery would be annihilated at case shot ranges, and against cavalry, since only two rounds at most can be fired, the noise and flame, even if round shot were being fired, would have almost as much effect! It is claimed for it that it is always ready and always at hand, but Wille claims that shrapnel can be equally kept at hand by using portable magazines, and with his proposed very high I.V. the shell may be fired with the fuzes set at 0, and yet cover a depth of 350 to 400 yards. Needless to say on this point of the abolition of case shot the General has many opponents among his critics at home and abroad, as will be seen later.

Number of Rounds per Battery.—From the number of rounds expended in the principal battles of this century, Wille deduces—

1. That the expenditure has much increased in recent wars.
2. The average expenditure in a campaign was about $1\frac{1}{2}$ times the equipment of batteries.
3. Detached batteries seldom fired more than their equipment.
4. Heavy guns generally fired more rounds than light guns.
5. The expenditure was greater in big battles than in small.

From this last, he infers that horse artillery batteries may carry fewer rounds than field, since they are usually engaged in small combats.

The average number of rounds now carried in light batteries of all nations is 142, and in heavy, 128.

Basing his calculation on the experiences of the Franco-German War, General Wille allows his gun of the future 135—140 rounds per battery.

Mobility.—This very important question Wille goes into very fully, and traces the gradual increase of weight of equipment since the

early wars of this century, an increase which, he says, has been accompanied by a diminution in the number of rounds carried.

Taking as a basis for calculation a maximum weight per horse in a 6-horse team of 660 lbs. (we take 600 as the maximum), he arrives at a total weight for gun and limber in complete marching order in horse artillery batteries of 34·3 cwt., and for field artillery of 35·3 cwt. (without gunners).

General Wille is not a believer in the probability of horse artillery in a campaign being called on to make a succession of long movements at a very rapid rate, and, like a true designer of guns, says that it is worth while to sacrifice some mobility to increased power in the gun.

A peculiarity under this head in his proposed equipment is that the limbers should be fitted to carry five separate ammunition boxes, each containing six rounds.

In horse artillery batteries one of these boxes is left behind when the batteries are acting with cavalry divisions, but is again taken up (presumably from the nearest ammunition column) when the batteries form part of the corps artillery.

It will be seen that this furnishes a horse artillery gun with only 24 rounds, and a field battery gun with 30, viz., 12 and 6 rounds respectively less than our horse and field batteries, but General Wille reminds his readers that the Russian horse artillery limber only carries 20 rounds, including 3 case shot, and the French 90 mm. gun has only 26 rounds, including 2 case shot.

These proposed limbers are to carry in field artillery 4 gunners, 3 facing the horses, and 1 on a special seat, facing the rear.

The General strongly favours the idea that the ammunition wagon should, if anything, exceed the gun in mobility, and on no account fall behind it, and proposes the weights of his horse artillery wagons at 33·3 cwt., and of his field artillery wagons at 34·3 cwt. *without* gunners. Six gunners give an additional 9 cwt., or five gunners 7·5 cwt. As both horse and field batteries have 9 wagons, they will go into action with 738 and 828 rounds respectively, or 123 and 138 per gun (against our 108 rounds).

Question of "Universal" Gun.—In proposing his new gun as the universal or only gun of field artillery, General Wille argues that it will meet all the ordinary requirements of field warfare, including the attack of entrenchments, which, as we have seen, he proposes to destroy with "battering shells" from his flat trajectory gun, and subsequently to resort to shrapnel against the troops seeking shelter in them.

If we are to provide guns to meet every *possible* contingency of field warfare, we must have a whole arsenal of weapons with an army in the field. He lays stress on the opinion that the objections to a "universal" or "general utility" gun are based on the properties of existing guns and ammunition. The impotence of these against regular earthworks was dearly learnt by the Russians in the Russo-Turkish campaign, but the introduction of high explosives for shells will materially alter the powers of field artillery in this respect, and

there is little reason to doubt that in the near future we shall possess shells which will make light of all possible spade-work in the field. Even in the existing state of artillery science, it is surely better to trust to the possibility of borrowing suitable guns from the siege trains to meet special emergencies than to arm our field artillery with hermaphrodite weapons—half guns, half howitzers.

The "Gun of the Future" to be a Q.F. Gun.—Lastly, General Wille's "gun of the future" is to be almost a Q.F. gun, *i.e.*, its recoil is not to exceed one yard. He looks to the further development of artillery science to overcome the two principal objections to the principle of Q.F. guns, *i.e.*, the dense smoke and the recoil. The former has already been practically obviated by the introduction of smokeless powders. The latter Wille proposes to remedy by the reduction of calibre and by his longer lighter shells.

The pros and cons of the Q.F. principle for field guns Wille touches on somewhat lightly, more so than on any other point connected with his proposed gun of the future.

Such are the views propounded by General Wille in the theoretical portion of his essay on the "Field Gun of the Future." Before referring to the many German and foreign criticisms he has evoked, it will be as well to summarize in tabular form the particulars of this ideal weapon.

1. *Gun and Wagon.*

For horse or field batteries.	{	A universal gun, calibre 2·756, I.V. at least 2,625 ft.-sec.	
		Weight of gun, 7·85 cwt.	
		,, carriage without gun, 10 cwt.	
		,, limber complete, 15·7 to 16·6 cwt.	
		Weight of gun and limber complete, 34·3 to 35·3 cwt.	
		Draught load per horse, 660 lbs.	
		Number of rounds in limber, 30.	
		,, men on limber, 4.	
		Weight of ditto, 6·1 cwt.	
		Weight of gun and limber (with gunners), 41·2 cwt.	
		Draught load per horse, 770 lbs.	
		Weight of wagon complete, 33·4 cwt.	
		Draught load per horse, 550 lbs.	
		Number of men carried, 6 or 5.	
		Weight of ditto, 8·3 or 7·6 cwt.	
Horse artillery batteries.	{	Weight of wagon with gunners, 41·7 or 41·0 cwt.	
		Draught load per horse, 800 or 780 lbs.	
		Number of rounds per wagon, 72.	
		Weight of gun and carriage, 18·6 cwt.	
		,, limber complete, 15·7 cwt.	
		,, gun and limber, 34·3 cwt.	
		Draught load per horse, 640 lbs.	
		Weight of wagon, 33·4 cwt.	
		Draught load per horse, 620 lbs.	
		Number of rounds in limber, 24 } 90.	
		,, ,, wagon, 66 }	

2. *Ammunition.*

Shrapnel and battering shell; weight, 14·3 lbs.
 In proportion of $\frac{1}{4}$ to $\frac{1}{3}$ battering to $\frac{3}{4}$ to $\frac{2}{3}$ shrapnel.

3. *Composition of Battery.*

Guns, 6.
 Wagons, 9.
 Spare carriages, 3.
 No forges.

Number of Rounds carried.

In field batteries, 828.
 Per gun, 138.
 In the fighting line (with 3 or 4 wagons), 396 or 468.

In Horse Batteries with Cavalry Divisions.

Number of rounds, 738.
 Per gun, 123.
 In the fighting line (with 3 or 4 wagons), 342 or 408.

Such is "the field gun of the future" as advocated by General Wille.

The following are the criticisms, favourable and unfavourable, under each head, of writers in various foreign periodicals.

Weight of Shell.—The French "Revue Militaire" and "Revue d'Artillerie" generally approve the weight and calibre adopted by Wille as sufficiently powerful for field artillery purposes. The latter journal, however, remarks that the weights of all existing field shells give too wide limits for the average to be of any value as a guide, considering, for instance, the very different duties of horse and field batteries, and that it would have been better to take the average of the field battery shrapnel shells of the present day, which would give a weight of 15·9 lbs.

The German "Militär Wochenblatt" thinks the proposed shell too light, and in view of the probable assimilation of weights in the German Army of the shrapnel and common shells (their present weights are 17·7 lbs. and 15·4 lbs. respectively) would take the mean, *i.e.*, 16·5 lbs.

The Russian "Artillery Journal," on the other hand, entirely approves General Wille's shell, which allows of reduction of calibre, reduction of weight of gun, and consequently of a near approach to a Q.F. gun.

Calibre and Initial Velocity.—On these two points, certainly the most important in designing a new gun, General Wille has evoked the strongest criticisms. Captain Moch, in the course of a long article in the French "Revue d'Artillerie," meets him face to face

with the assertion that in these respects his gun is an impossibility. To produce his I.V. of 2,625 ft.-sec., the General requires a muzzle energy of 685 ft.-tons.

Moch argues from Krupp's 3.36-in. gun, with a length of 11.2 ft., which produced a muzzle energy of 648 ft.-tons, that the General's gun, with a calibre of 2.756 in., must have a length of over 13 ft. This gun of Krupp's weighed 20.75 cwt., and proportionally Wille's gun should weigh 12 cwt., instead of the 7.75 cwt. at which he fixes it. This latter weight would entail a strain of 88 ft.-tons per cwt.

It is true that the General relies largely on the results to be obtained from the new powders, new processes of forging guns, new materials for them, and, lastly, on reduction of calibre. But in the opinion of Captain Moch, he has gone to the very extreme in his expectations from each of these. As regards the new powders, they have been the subject of study and experiment for over forty years. And it is impossible to expect any very startling innovation under this head, though improvements in detail are no doubt probable.

The "Militär Wochenblatt" echoes Captain Moch's objections on the same grounds of the General's miscalculation, or, rather, non-calculation, of the energy required to produce his extraordinary I.V.

The Russian critic approves Wille's weight of shell and his calibre, but acknowledges that he has passed by too lightly the difficulties in the way of producing his I.V. under his proposed conditions.

Accuracy.—As General Wille has touched but delicately on this point in connection with his proposed gun, so also have his critics dealt lightly with it. The German "Militär Wochenblatt" and the French "Revue Militaire" accept his claims in silence, except that the latter comforts itself for any possible superiority in a German gun by the reflection that the element of personnel remains the same in all countries, and, consequently, a flatter trajectory and a longer range only render errors in laying and fuze setting more detrimental to effect. Captain Moch apparently contents himself with his exposure of the impossibility of the proposed gun itself, and says nothing on this head. The Russian writer thinks that General Wille has rather shirked this important question, especially as regards the angle of descent at long ranges of the projectiles of his proposed gun, and considers that the omission of any calculation in support of his assertions deprives them of any value.

Number of Kinds of Projectiles.—As regards case shot, the "Revue Militaire" says that the numerous examples quoted by Wille in favour of its abolition only go to prove that it is not often employed, not that it is useless. It has never of recent years been considered as anything but a projectile for use in *emergencies*, and as long as it remains the only projectile for use at close quarters it cannot be abolished. Moch in the "Revue d'Artillerie" does not object to its abolition, but remarks that, in considering its value, only unsuccessful combats should be referred to, and the General is at least wrong in limiting its effects to 400 yds.; the French case shot is effective at nearly double that range. He strongly objects to Wille's proposed shrapnel fuze set normally at 0, as in the hurry of action the setting

of the fuze for longer ranges might be omitted accidentally, and the shell thus burst behind the backs of one's own infantry in front of the guns. The Russian "Artillery Journal" looks on the question of abolishing case shot as on a par with that of side arms for artillery, which are rarely used, but must be provided for cases of emergency.

As regards "battering shells," the Russian critic remarks that it must be remembered that little is known concerning them, the French and German Armies alone have finally adopted them into their equipments, and the secret of their construction and the nature of the bursting charge is jealously guarded, but we may be sure that their value has been fully proved. From what has leaked out on the subject, it appears that the German shell has thick walls, is fitted with a time and percussion fuze, and is designed to act against troops behind cover, rather than against the cover itself. The French shell, on the other hand, has thin walls, a percussion fuze only, and is meant to act as a "fougasse" or mine against the cover itself, resort being had afterwards to shrapnel shell against the personnel of the enemy.

Number of Rounds per Battery.—The Russian critic expresses surprise that Wille, although he proposes his gun as almost a Q.F. gun, pays no attention to the evident necessity connected with the Q.F. principle for a very large increase in the number of rounds carried. This is the more remarkable, as he speaks of it in connection with infantry and the magazine rifle.

Mobility—The "Revue Militaire" has no serious objections to General Wille's figures under this head, though the number of gunners carried on the limbers in field batteries might have been reduced to three, and more rounds carried. The "impossibility" of Wille's proposed gun, however, deprives of all value his figures on the question of mobility.

"Universal" Gun.—As regards the proposed gun being the "universal" gun, the "Artillery Journal" says that the Germans and Austrians have already adopted the principle (the former in their 8.8-cm., and the latter in their 8.8-cm. guns), but *without discarding* field howitzers and mortars.

The "Revue Militaire" prefers the idea of an universal calibre, which, without forfeiting the advantages of uniformity in ammunition, would allow of horse artillery being armed with a sufficiently light gun, and field artillery with a sufficiently powerful one.

The Q.F. Principle.—The "Revue Militaire" says that, so far, experiments in this direction have not been successful, the recoil can only be overcome by using a light shell of small calibre, and this means loss of power and impossibility of observation of fire. These disadvantages more than counterbalance any advantage in Q.F. guns.

The Russian critic, on the other hand, accepts willingly the Q.F. principle as a necessity in all field guns of the future, subject always to this condition—that their Q.F. qualities should be kept in reserve for emergencies. Their production is only a matter of time. He lays down the following conditions for a Q.F. gun:—

(1) No recoil; (2) laying and loading to be the duties of different numbers at the gun; (3) a traversing arrangement independent of the trail; (4) cartridge shell and fuze in one; (5) a double-action (T. and P.) fuze always in the shell.

Of these, the 1st and 3rd constitute the technical difficulties at present.

A serious objection to the cartridge and shell being in one is that the metal cartridge case represents a considerable amount of dead weight, and is much liable to injury in the limber boxes. It also, in a long-continued action, would be a danger and hindrance to the working of the gun, *i.e.*, the cases would accumulate in heaps on the ground. The adoption of an easily-consumed material (of the nature of celluloid, *e.g.*) might obviate this, or, possibly, powder of the "cordite" description would not require a case at all.

This writer mentions that the Germans, in their experiments with Q.F. guns, have kept the shell separate from the cartridge, which is, however, carried in a metal case.

N.B.—The above criticisms of different foreign journals have reference only to the first or theoretical portion of General Wille's brochure, "The Field Gun of the Future," which is alone under review in the present article.

General Wille has published a second portion of his brochure, containing full details of the construction of his proposed gun and its equipment, which is too technical to be of much interest to the general military reader.

Bearing in mind the general features of this design of an eminent German artillerist, *viz.*, a Q.F. gun 9 ft. 2 in. long, weighing $7\frac{3}{4}$ cwt., and throwing a shell $14\frac{5}{16}$ lbs. with an initial velocity of 2,625 ft.-sec., let us turn to the almost simultaneous proposal of M. de Nordenfelt, also of a Q.F. gun.

Proposed Q.F. Field Gun of M. de Nordenfelt.

Weight of shrapnel shell, 10·34 lbs.

Calibre of gun, 2·95 in.

Initial velocity, 1,474 ft.-sec.

Nordenfelt quotes from various well-known writers, including v. Wille, the opinion that the time has come for a radical change in the armament of artillery of all the great Powers to meet the altered conditions brought about by the introduction of smokeless powders and magazine rifles, and he has no doubt that this change must take the form of Q.F. guns. By the adoption of this principle alone can we satisfy the rival claims of "power" and "mobility." The latter has been more and more sacrificed to the former, and the climax may be said to have been reached in the English 12-pr., with the highest initial velocity of any field gun in Europe, and the greatest "want of mobility."

Conditions of a Q.F. Gun.—Nordenfelt briefly summarizes thus what

he conceives to be the absolutely necessary conditions of an effective Q.F. field gun.

1. Ammunition contained in metal cases containing its own means of ignition, viz., caps like rifle cartridges.

2. A breech-action so rapid as to cause no delay longer than that necessary for laying and adjusting fuzes. This action to be very simple and very strong.

3. The gun carriage to be fitted with elevating and traversing gear, *independent of the trail*, for laying over considerable angles of frontage.

4. Recoil of the gun to entail no recoil of the carriage. Relaying after each round to be unnecessary beyond the slight correction of the displacement due to vibration in rapid firing.

5. The weight of gun, carriage, and limber to be so distributed as to admit of the limber carrying at least 50 rounds.

6. Total weight of gun and limber not to exceed 32·4 cwt., or about 605 lbs. draught load per horse in a six-horse team.

No gun can be called a Q.F. gun that does not absolutely absorb recoil, and, to make up for the lighter weight of the proposed shells as compared with existing shells, the number of rounds carried must considerably exceed the number carried at present.

In designing a new field gun, the weight of the gun itself must be considered for all *practical* purposes, in connection with the weights of its carriage and limber, and this is still more true as regards Q.F. guns, where the weight has to be distributed so as to check recoil.

The initial velocity and "live force" produced in a Q.F. gun must not exceed the resistance of the friction between the carriage and the ground, assisted by artificial means.

In this latter connection numerous expedients have been devised, which have all had serious defects, such as causing "jump," interfering with the laying and working of the gun, &c., and Nordenfelt proposes to find a solution by allowing the gun to recoil *on its carriage*,¹ without entailing recoil of the latter on ordinary ground. In addition the carriage will be fitted with brakes for use on unfavourable ground.

Nordenfelt admits that a carriage under these conditions would not allow of the weight of projectile and I.V. of General v. Wille's gun, but, as will be seen, he proposes to compensate for his light shell by the Q.F. powers of the gun.

Weight of Projectile, I.V., and R.V. of Q.F. Gun.—Assuming the maximum weight of gun and limber for a really mobile gun at 31·4 cwt., Nordenfelt says that in distributing this weight we have a fixed quantity in the weight of the limber decided by conditions of strength and number of rounds carried. The remainder of the total weight is divided between the gun and its carriage, and as much as possible should be allowed for the gun, and that part of the carriage which moves with it.

¹ Probably in the same way as our 12-pr. B.L. carriage, Mark II, which has not been a success.

By using smokeless powders we can obtain an initial velocity of 1,476 ft.-sec., with a maximum bore pressure of 1,800 atmospheres, firing a shell of 10·34 lbs., with a calibre of 2·95 in. A smaller calibre entails, for the same I.V., a greater charge and a longer gun than are suitable for Q.F. guns. The above conditions Nordenfelt says will give R.V. of 787 ft.-sec. at 3,300 yds., and of 623 ft.-sec. at 5,500 yds., with angles of descent respectively of 10° and 20° .

The R.V. here quoted is far less than Wille gives for his proposed gun at the same ranges, and is slightly less than the "Sotomayor" Spanish gun, and the French 8-cm. gun, but at 3,300 yds. is only 32 ft.-sec. less than the English 12-pr. with its far higher I.V.

Nordenfelt quotes various authors in support of the opinion that 5,500 yds. is the extreme range of *useful* artillery fire, owing to impossibility of observation, &c., and also that the introduction of smokeless powders will tend, if anything, to decrease this range rather than to increase it. His weight of shell, 10·3 lbs., is very little less than the average of existing shrapnel for light guns.

Comparing his shell with the French 13·8-pr. (8-cm. gun), he says that the limber of the latter carries 30 rounds: for the same weight of shell the Q.F. 10·3-pr. should carry 25 per cent. more, but he proposes to carry in his limber 48 or 50 rounds.

A heavier shell would, no doubt, with the present bursting charges, be more effective against entrenchments, but with the introduction of "high explosives" for bursting charges, the advantage would probably be with the Q.F. shell.

A considerable advantage is gained by the light shell in the matter of ranging.

A French 8-cm. battery, for instance, using 9 rounds for this purpose, would have expended 125 lbs. of metal, against 93 lbs. with the Q.F. 10·3-pr., a difference of about three shells, which can be usefully expended by the latter after the range is found.

It should be noted here that Nordenfelt is in favour of equipping his Q.F. gun with only shrapnel shells (French "*obus à mitraille*"), a composition being mixed with the bursting charge, so as to make the shell available for range-finding purposes.

Accuracy.—Nordenfelt does not believe in a useful increase of accuracy from high I.V., using the same arguments on this side of the question that have already been referred to in the criticisms on General Wille's views on this point.

Weight of Cartridges and Cases.—Nordenfelt produces very favourable figures on this head in comparing his gun with General Wille's, which it will be remembered is also to be practically a Q.F. gun. Taking the General's figures, a 14·3-pr. with a 3·6 lbs. charge, he says the complete cartridge will weigh at least 22 lbs.—besides being very long and very expensive. His own cartridge will only weigh 12·5 lbs. Wille's 30 rounds per limber will give only 429 lbs. weight of metal, whereas the Q.F. gun, with the same weight of limber, will have 52 rounds, with a weight of metal of 536 lbs.

Rapidity of Fire.—Nordenfelt refers to the Q.F. fortress gun of 2·24 in., and the naval Q.F. gun of 4·72 in., which have often fired

18 and 10 *aimed* rounds respectively per minute, and deduces that the Q.F. field gun, mounted on a carriage which has no recoil, should easily fire 10 or 12 aimed rounds a minute, against the 2 rounds per minute which represents the rapid *aimed* fire of the present field guns.

Expressing this in weight of metal, a battery of 6 guns would fire in half a minute 6 rounds weighing 83 lbs., against 30 rounds weighing 310 lbs., fired in the same time by the Q.F. battery.

It must be remembered that in neither case is such rapidity of fire likely to be necessary for any length of time, but against the present form of attack employed by infantry, and against cavalry, the advantage gained by the possible rapidity of fire of the Q.F. gun would be very great.

Laying and Ranging.—The effect of all artillery fire depends largely on the rapidity and accuracy of laying. Nordenfelt points out that with the present guns the gun-layer constantly has his attention distracted by his other duties in action, *i.e.*, running up the gun, supervising the adjustment of fuzes, &c. The physical exertion of some of these duties also militates against his laying uniformly and accurately.

With the Q.F. gun, on the other hand, the gun-layer has only to lay and work the firing apparatus. No running up being necessary, he can remain in the same position, with his hands on the elevating and traversing wheels.

Again, in ranging the battery, the commander can, if he wishes, employ only one gun, laid by the same man every time, a great advantage as regards simplicity of command and uniformity of laying.

Adjusting Fuzes.—The difficulty of getting the fuzes adjusted with accuracy during such rapid fire as Nordenfelt asserts to be obtainable will probably occur to most artillery readers. Nordenfelt touches rather lightly on this subject. He says it will probably be necessary to adjust beforehand a certain number of fuzes in the intervals of very rapid fire. He considers fuzes with movable parts which require the operations of screwing and unscrewing (such as our own T. and P. fuze) far inferior to the French and Italian fuzes, which only require to be perforated at the proper hole to be ready for use, and with such fuzes he considers there will be no difficulty in adjusting the fuzes quickly enough for the most rapid fire.

Supply of Ammunition.—Nordenfelt proposes to equip his light Q.F. battery of 6 guns and 9 wagons with 1,638 rounds, or 273 per gun, carried as follows:—

6 limbers at 48 rounds	= 288
9 wagon limbers at 48 rounds ..	= 432
9 „ bodies at 102 rounds ..	= 918
	<hr/>
	1,638

As compared with—

French 8-cm. gun (9 wagons)	936 rounds.
Spanish (Sotomayor 7·85-cm.) (6 wagons)	648 „
Swedish 7·5-cm. (8 wagons)	1,122 „
German 8·8-cm. (8 wagons).....	808 „
English 12-pr. B.L. (6 wagons).....	648 „

Note.—Of these the French, Swedish, and German guns have apparently four boxes on the wagon bodies, the remainder only two.

Nordenfelt speaks of boxes each containing six rounds, and completely interchangeable, which can be carried on a man's arm; but it is not clear whether these are the actual ammunition boxes or "portable magazines" after the German fashion, which fit, with the rounds ready in them, into the ammunition boxes on the limbers and wagons.

This latter plan is far preferable to our own portable magazines, as the ammunition can be replaced far quicker when the battery changes ground. Nordenfelt strongly favours the abolition of case shot, and, as has been said before, the retention of shrapnel only as the projectile for field artillery.

Shields.—Nordenfelt recommends the adoption of gun shields for the protection of the detachments, but does not propose any particular pattern of his own invention.

Reduction of Number of Guns per Battery.—The introduction of a Q.F. gun gives a new aspect to this question. With the present guns, six has been generally admitted to be the *minimum* to produce sufficient fire effect, and to enable ranging to be carried out rapidly, and the *maximum* to allow of facility of manœuvre.

But as the rapid fire of four Q.F. guns is more than equal to that of six of the existing guns, as regards weight of metal thrown in a given time, and the ranging can be better carried out by a single Q.F. gun, Nordenfelt considers that the advantages of greater intervals between the guns, smaller target in men and horses, and less frontage of a line of batteries, point to the adoption of four-gun batteries. Moreover, the reduction of two guns allows of the adoption of two more wagons without increasing the depth of the column of route beyond the existing figure. These eleven wagons would bring the total number of rounds carried with a battery up to 1,842, or 640 rounds per gun, almost the *total equipment* of an *English 12-pr.* battery of six guns.

The remainder of Nordenfelt's essay is taken up with suggestions as to the tactical employment of the proposed Q.F. guns, and is beyond the scope of the present article.

In these pages, however, occur some figures relating to the fire effect of the new guns which are worth quoting.

Cavalry attacking a battery pass over 330 yards in a minute during their advance. Nordenfelt claims that during this minute each gun can easily fire 10 to 15 rounds, or 60 to 90 per battery of 6 guns.

His 10·3-lb. shrapnel shell will contain 120 bullets, so that from 7,200 to 10,800 bullets will be fired at the cavalry during their advance over 330 yards. A French 8-cm. battery would fire 18

rounds, or 2,916 bullets in the same time. Again, infantry advancing by rushes of half a minute duration would be met by a fire of at least 30 rounds in that time from a 6-gun Q.F. battery against 6 rounds from the 8-cm.

The advantage, as has been shown, of the heavier shell with higher I.V. is rather in the length than the width of the cone of bullets after burst, and would show itself rather against columns than against lines.

In prolonged fighting, the expenditure of ammunition is much in favour of the Q.F. gun. An expenditure of thirty rounds per gun with the 8-cm. empties the limber boxes, and means an expenditure of nearly one-fifth of the total ammunition of the battery. A similar expenditure with the Q.F. gun leaves 108 rounds in the limbers, and only one-ninth of the total ammunition has been fired.

Conclusion.

Such, then, are the two most distinct types of the field gun of the future which have yet been put before the military public. It will be observed that both writers agree in the necessity for a bold departure, a complete rearmament of field artillery, to meet the requirements of new tactical conditions; not a very comforting idea to us, who have just been congratulating ourselves on having rearmed, or nearly rearmed, our artillery with "the best field gun in Europe."

Both writers, too, agree in the necessity for the adoption, in some form or other, of the Q.F. principle; and this again is very disquieting for us; for, though it is an open secret that the 12-pr. B.L. in its present form, having utterly failed in mobility, at least as a horse artillery gun, is to be supplemented as speedily as possible by a lighter gun with a weight behind the horses not exceeding 33 cwt., there is no rumour so far of the Q.F. principle being adopted.

Both of the guns described in this article will no doubt find many critics among our own artillerists, scientific and practical, and no one probably will read the arguments of the authors themselves without feeling that they have both passed by too lightly some of the most serious objections to their proposed guns.

Accepting both guns as possible under the conditions laid down by their authors, it may be stated without hesitation that Nordenfelt's Q.F. 10·3-pr. presents by far the more attractive picture of the two to the field artilleryman, who has to think not only of the possible effect of his gun on the battlefield, but of the difficulties of getting it there, with all its accessories of men, horses, and ammunition, and of working it when there, under all conditions of ground and weather. Few artillery Officers of our Service, who have served with 12-pr. batteries of recent years at manœuvres in England and India, will think without a shudder of Wille's 9-ft. gun with its complicated carriage, even with its great advantages over the 12-pr. of some 5 or 6 cwt. less weight behind the horses and more liberal supply of ammunition. There is also among us a widespread feeling of aversion in principle and practice to these enormous initial

velocities, to which so much has been sacrificed. On the other hand, it may be said that English artillery Officers have always had an instinctive dislike to anything in the shape of a "machine gun," which a Q.F. gun undoubtedly is, although the two terms have of late years been generally accepted as applying to infantry and artillery weapons respectively; and a Q.F. field gun would have to stand very severe tests to bring it into favour. Granting, however, the possibility of overcoming all possible objections on this head, the weights and the generous supply of ammunition of Nordenfelt's gun are surely very attractive.

Fuller and more scientific criticisms of both Wille's and Nordenfelt's proposals will probably appear before long in our own military periodicals; the object of the present article has been only to present to the general military reader some idea of the direction in which military thought on the Continent on this important subject of "Field Artillery of the Future" is now tending.

[*Author's Note.*—The arguments and figures produced in this article relating to General Wille's gun have been taken by me at second hand from the very long article entitled "Field Artillery of the Future" which has appeared in successive numbers of the Russian Artillery Journal during the present year. My ignorance of the German language has prevented my producing them at first hand, and I must plead this excuse for any errors that may do injustice to the conclusions of the distinguished author of "Das Feldgeschütz der Zukunft."—E. L.]



Royal United Service Institution View from Whitehall
Aston Webb & E. Ingress Bell
Architects

Handwritten notes and symbols in a vertical column, including various marks and the word "Klein".



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View from Whitehall Gardens

The Journal

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THE LAGOS EXPEDITIONARY FORCE, 1892.

IN the August number of the Journal appeared a very interesting account of the Lagos Expedition, kindly furnished by Captain the Honourable A. Hardinge, the Royal Scots Fusiliers. Colonel A. B. Ellis, Commanding 1st Battalion West India Regiment, has sent to me a letter expressing his dissent from some of the remarks contained in the account. I have much pleasure in inserting in the Journal Colonel Ellis's letter, and one from Captain Hardinge in reply to it.—L. A. H.

*Sierra Leone,
30th August, 1892.*

DEAR SIR,

In the interesting account of the Lagos Expeditionary Force, in West Africa, which appeared in the Journal of the Royal United Service Institution for August, the gallant author, Captain Hon. A. S. Hardinge, the Royal Scots Fusiliers, has, I am sure unintentionally, conveyed by implication the idea that West India soldiers are, from health considerations, unfitted for service in the bush in West Africa.

I do not like to intrude upon your valuable space, but, unless these erroneous impressions are corrected, they are calculated to do harm to the regiment to which I have the honour to belong, and I therefore hope you will be able to find room in your Journal for this correction.

The statement to which I refer is to be found at page 917, and runs as follows :

“Of the 100 men and 3 Officers of the West India troops sent down, only 42 men and 1 Officer were fit to proceed to the front, the remainder having already succumbed to fever. These troops cannot be said to be well adapted to bush marching, they require the same rations and commissariat arrangements as European troops. Spats and European shoes are not conducive to great powers of marching when worn by natives ; and without possessing the inherent pluck of the white man to struggle and shake it off, they succumb as readily to the ravages of fever as the European.”

Many people on reading this would suppose, from the use of the word “already,” that the Officers and men of the West India Regiment had succumbed to fever without anything exceptional having occurred to account for it ; but when these Officers and men were suddenly ordered to embark for Lagos, they had only just returned from three weeks' active service in the bush in the Tambaka country, where they had undergone much hardship and exposure. The Local Regulations only provide deck passages for West India soldiers proceeding up or down the coast, and during fifteen out of the seventeen days which the voyage from Sierra Leone to Lagos occupied, torrents of rain fell. The scanty awnings afforded no shelter, and day and night the men were constantly wet ; and this exposure, coming after the hard work of active service, was the cause of the sickness.

It is a mere matter of detail that 65 West Indians took part in the expedition and not 42 only. Ninety-nine arrived at Lagos, and 34 had to be left there sick, *i.e.*, a little more than a third, instead of more than half. It is of course an unusually large percentage, but when we consider what being constantly in wet clothes for fifteen days means in such a climate as this, the only wonder is that it was not larger.

West Indians do “succumb to the ravages of fever as readily as the European,” but they are not so liable to contract fever, and when they do get fever it is rarely

of a severe type. After a residence of six months comparatively few West Indians contract fever at all, while the European becomes worse the longer he stays. The men who went to Lagos had only been four months in West Africa, and were not yet acclimatized. If the climate really had as baneful an effect on West Indians as it has on Europeans, we should have to invalid 400 men to the West Indies annually, while the average invalided is thirty triennially, or ten for one year.

In regard to the other matters touched upon, the fact of the West India soldier requiring the same rations and commissariat arrangements as the European is no real disadvantage except when the movements of very small bodies of men are concerned. The natives of West Africa do not keep supplies of provisions on hand surplus of their own requirements, and after eighteen years' experience of West Africa I only know two or three towns that could meet the demand for food caused by the sudden arrival of 100 men. I except, of course, the sea-port towns. Whenever larger bodies of men have been employed it has always been found necessary to carry supplies, for the country could not furnish what was required.

Even in the present case some difficulty in obtaining food seems to have been met with, and from the accounts in the Lagos papers, it appears that after Jebu Odi was reached, the question of supplies became a matter for serious consideration, and parties had to be sent to the neighbouring villages to induce the natives to bring food. If the Jebus had possessed the spirit of the natives of the Gold Coast and had refused to supply the needs of their foes, it is very probable that the expedition would have failed to secure the objects desired. Personally, I have always found it advantageous to take one's own supplies, even with Houssas, in order to be quite independent.

Of course the only objection to carrying supplies for troops is that it increases the number of carriers, but against that we must set the transport required for the extra ammunition for untrained men, who expend enormous quantities. At pages 918, 919 of the gallant author's account, we read that, though the Houssas and Ibadans carried their own supplies, 600 carriers were required for the Officers, the West Indians, six guns, the ammunition reserve, and hospital, &c.

I dislike making comparisons, but, in order to prove my point, I must mention that in the Tambi expedition, when 25 Officers and 518 regular troops were employed, with three guns and two rocket troughs, the number of carriers for all purposes, rations, hospital, ammunition reserve, guns, &c., never reached 500. From this it would appear that it is more economical of carriers to employ troops than constabulary.

In regard to the question of boots and shoes for Natives, everything of course depends upon whether the Natives are accustomed to wear them. If they are not, they get footsore, but the West Indian is as much accustomed to shoes as the European, and could not march without them. Spats do not increase or diminish a man's marching powers, but I agree that shoes are not the best kind of foot covering, and would much prefer boots. However, even in shoes, these 100 West Indians, in common with the rest of the column, marched from Tambi to Robat, a distance of 76 miles, in three days, which I venture to think is a very creditable performance in a country where the roads were the merest single-file tracks, and where four or five streams had to be forded daily.

Having myself served with the Houssas for two years, and taken part with them in several small expeditions, I may claim to know something of the question of boots *versus* bare feet, and I say, advisedly, that a larger percentage of bare-footed men get laid up from injuries to feet from thorns and stones than of booted men from galls, &c. I have seen 40 per cent. of a force of Houssas rendered unfit for further marching through having to pass through a tract covered with stunted prickly-pear, over which I, in ordinary boots, passed without the slightest inconvenience. But it must be sufficiently obvious that the wearing of boots is an advantage, except for men who are not accustomed to wear them.

As I have necessarily been compelled to some extent to compare West Indians with Houssas, I must be careful to explain that I have no wish to detract in any way from the merits of the latter gallant body. I have a very great admiration for the Houssas, and therefore I am the more sorry to see that the gallant author

has little to say in their favour beyond that they possess personal courage, a quality which I have never found lacking in any negro tribe.

I am less concerned to defend the Houssas from possible misconceptions than my own men, but I think that some portions of the last paragraph on page 920 require explanation. I refer particularly to the words, "notwithstanding that in proximity to the river they appeared imbued with the ascendancy of the Jebu. Permeated as they are by superstition and fetish customs, every allowance must be made for them."

The ordinary reader would, I imagine, gather from this that the check experienced at the river was due to the Houssas hesitating to cross under the heavy fire of the Jebus, and that the Houssas are permeated by "fetish customs," by which phrase the religious customs of the natives are no doubt meant. The check, however, was not due to fear of the Jebus, but to another cause. The religion of the Jebus resembles that of Ancient Greece in every particular, and, like the Ancient Greeks, the Jebus offer human sacrifices in time of need. They had, in this case, offered a human sacrifice to the river-god, to induce him to assist in staying the advance of the British force; and it was a feeling of uneasiness as to what this unknown power might do that made the Houssas hesitate. They are not, however, permeated with "fetish customs." They are Mohammedans, though not, perhaps, very strict ones, and they regard all pagan practices with horror and detestation, though, while detesting them, they are still half doubtful as to whether they do not possess power for evil. In this respect they are on the same footing with many Europeans, notably some of the German missionaries, and we cannot expect a whole tribe of Africans to be so superior to their surroundings as to regard such practices with contempt. Directly the handful of West Indians, who had been held in reserve, were ordered up to the front to lead the way across the river, the Houssas crossed with them without further hesitation.

Considering the implied short-comings of the West Indians and Houssas, it is surprising that the Expeditionary Force ever reached Jebu Odi; but I am convinced that Captain Hardinge has quite unintentionally disparaged, or seemed to disparage, those in whose company he fought.

Yours obediently,

A. B. ELLIS, *Col. and Lt.-Col.,*
Com. 1st Batt. W.I. Regt.

Colonel Lonsdale Hale, R.E., ret.,
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Aldershot.

DEAR SIR,

I have read Colonel Ellis's remarks with much interest; and I much regret that he should think that anything I had said in my article had reference to the efficiency of the West India Regiment which he has the honour to command. All I wished to compare were the different characteristics of his native troops and police and their aptitude for their arduous duties, necessitated by the climate and bush warfare on the West Coast of Africa.

Yours obediently,

A. S. HARDINGE, *Capt.,*
Roy. Scots Fus.

Colonel Lonsdale Hale,
R.U.S.I.

FOREIGN SECTION.

THIS portion of the Number, hitherto the Occasional Notes, has now become the Foreign Section, and is reserved for articles, either original or compiled, on professional subjects connected with Foreign Naval and Military matters; also for notices of Professional Books, either Foreign or English.

It is requested that articles, communications, and books for review (the latter under cover to the Librarian) may be addressed to me at the Royal United Service Institution, Whitehall Yard, London, S.W.

LONSDALE HALE,
Colonel R.E. ret.

GERMAN DIVISIONAL CAVALRY.

By Major C. BARTER, D.A.A.G.

RECENT alterations made in the German official "Felddienst-Ordnung," or Field Service Manual, are of interest, as showing the successive changes of opinion regarding the employment of cavalry with the larger units in the field.

During the last few years there had been a tendency to use cavalry in masses on the battle-field, and accordingly two years ago, in imitation of the French organization, it was decreed that in war there should be formed Army Corps Cavalry Brigades, placed directly under the Army Corps Commanders. The cavalry regiments belonging to the infantry divisions were to be withdrawn from them for this purpose, and to each division was to be detailed a small detachment of cavalry, varying in strength according to the necessities of each case.

This organization did not, however, give satisfaction at the autumn manœuvres of the past two years, and the old order of things is now reverted to, the Army Corps Cavalry Brigades being abolished, and a cavalry regiment again forming an integral part of each Infantry Division.

It is stated in the new instructions that the chief duty of the

divisional cavalry after gaining close touch with the enemy is to consist in reconnoitring work, although a tactical use of this cavalry is not excluded, should a favourable occasion present itself. Heretofore the instructions, on the contrary, made the tactical employment of the cavalry the chief consideration, giving the reconnoitring work a secondary, though still important, place.

The tenour of the latest orders points generally to the opinion that the principal *rôle* of cavalry in the future will be that of securing safety for the infantry in front and on the flanks, both on the march and on the battle-field. As regards the tactical use of cavalry, it is considered that precisely by its intimate connection with the Infantry Division will it in this sense find its best chances of employment, but not so often in large as in small bodies, that is, generally by squadrons. With regard to this point, criticisms which have appeared in the German press on the new instructions point out that with the new order of things, there will be presented to small bodies of cavalry, well led by Commanders able to make the best use of natural ground features, favourable opportunities, during the course of an action, for rapid and energetic surprises. Attention is called to the fact that in the Franco-German War the German cavalry in the north and north-west of France thus attacked sixteen times, and that twelve times it was completely successful. All these attacks were made by bodies consisting of two or less squadrons.

A point which has of late been much discussed in German and Austrian military literature is also settled by the new instructions. It is decreed that in future no body of troops down to, and including, single battalions, are to be without a few cavalrymen for reconnoitring purposes, and it is expressly stated that the number of cavalrymen is to be measured by the necessities of each case, so that it will not be necessary to employ infantry patrols when on the march. When independent cavalry bodies are being formed, the requirements of the infantry in this respect are to be taken into account.

The projected allotment in war of a few cavalrymen to other units, in this manner, follows closely upon a similar measure introduced into the Austrian regulations for field manœuvres.

GENERAL JARRAS.¹

GENERAL JARRAS having died, his widow has published his "Souvenirs," which are of great value to military students, as they are founded on his notes, made during the siege and directly after the fall of Metz. His evidence before the Conseil de Guerre on Marshal Bazaine, was not of great extent, but what there was, bore inward proof of extreme accuracy, and, as such was accepted at Trianon, where the court-martial was held under the presidency of the Duke d'Aumale.

General Jarras was promoted to the rank of Division-General in July, 1867, after an honourable career, including war service in the Crimea, Algeria, and Italy. Marshal Niel, Chief Executive Officer of the Army under the Emperor, appointed him head of the "Depôt de la Guerre," an office corresponding in many respects with the Intelligence Division as at present organized in Great Britain. General Jarras was ordered to gather the best Officers of the Staff Corps, and whilst gradually collecting information and plans specially in reference to Germany, he was instructed to educate his subordinates for the higher duties of the Staff. The want of such information on foreign military matters had been recognized during both the Crimean and the Italian campaigns. The first necessity was the construction of good maps for military purposes; his predecessor had one of Central Europe, drawn on a scale of about 5 miles to the inch, which was a pretty design, in several colours, but inaccurate. As regards their own country, the French Officers, who required maps, were supposed to buy them from private sources. No money was allowed in the Military Budget for preparing maps of a foreign country; but by pinching from other votes, General Jarras concocted photographically a map of Western Germany on the scale of 1 inch to a mile; he did this by taking German Staff maps on a large scale, and amalgamating them on a reduced one. As the War of 1870 was conducted, the new map was of small use to its possessors. In 1867 the Luxembourg question showed that the position between France and Germany was a strained one, but no plan of campaign was formulated in case of actual hostilities: and neither the Emperor nor Marshal Niel could give Jarras information as to what maps were most likely to be needed by the Officers of an active Army presumably 300,000 strong: and he writes: "nevertheless the details of war cannot be improvised and conducted haphazard according to the events of the day or the inspiration of the moment." Marshal Niel seems to have fully recognized the advanced organization of Prussia, and that France unassisted could not expect victory if war was forced upon her.

¹ "Souvenirs du Général Jarras, Chef d'État-Major Général de l'Armée du Rhin (1870)," publiées par Madame Jarras, Paris, Plon and Co., 1892.

During the summer of 1868, Prussia and Bavaria were studied by the Staff under General Jarras. In 1869 the network of roads and railways leading from Strasbourg and Dusseldorf to Berlin was completely surveyed by various French Officers, of whom at least one was arrested whilst at work; at the same time a German Officer engaged in like occupation was arrested near Châlons. The organization and numbers of the German Army and the value of their autumn manœuvres were fully appreciated by the French Staff. Colonel Stoffel's reports were verified, and Southern Germany was found to be preparing for war "against France." The armies of United Germany were reported to be twice as numerous as the French forces; war material of all sorts was in good order and in large quantities: the German artillery was longer ranging, and more accurate than that of France, and was at least a quarter part more numerous, its organization was so mature, that in eleven days the German Army could be assembled on the French frontier.

During the winter of 1867-68 General Jarras prepared plans for telegraphic and railway combination with the view of concentrating troops on the French frontier if need should arise. A new corps of military telegraphists was formed, trained, and affiliated with the Corps of Engineers. A committee of high Officers was appointed in 1869 to regularize railway transport in case of war. In July of that year they made a preliminary report, but postponed further action till January, 1870: in August, however, Marshal Niel died, and General Le Bœuf, his successor, practically dissolved the Committee, whose labours, if completed, would have prevented the miserable confusion of the coming summer. General Jarras gives an eloquent and appreciative eulogy of Marshal Niel, who according to him foresaw the coming war, but had as Minister to act with a Cabinet distrusting and repudiating his forecast. Knowing the unreadiness of France, he was anxious, at almost any cost, to avoid war at least without assurance of foreign aid; and this was clearly unassured either from Austria or from Southern Germany. Nevertheless, his estimate of the gallantry of the French Army was just and unabated, and he died in his belief.

General Le Bœuf, the new Minister for War, for various reasons, did not sustain his predecessor's action, in organizing the "Garde Mobile," a first step towards universal Army service. The deputies feared that the enormous increase of trained men might encourage war for dynastic purposes; the Army was jealous of the new levies, the Regular Officers openly stated that the "Garde Mobile" was a force ready organized for insurrection against the Government and against Society. Le Bœuf accepted a diminished budget, the annual contingent of men was reduced, and a large number of Army horses, especially of the artillery, were struck off the establishments.

General Jarras considers the pressure for the reduction came from the deputies, who shortly afterwards pushed the nation hurriedly into war, and hence accuses them of want of logic; but Parliaments are illogical, not only in France, and it may well be that the grave suspicions of money voted for Army purposes being not strictly nor

economically applied, caused distrust among the deputies, as it has elsewhere.

In the spring of 1870, public opinion in France considered the foreign position less strained than it had been either in 1867 or 1868, and if war were to come, it would at least be postponed till 1871; what grounds for this opinion existed, the General does not state.

The Archduke Albert, cousin of the Emperor of Austria, came to Paris and was hospitably received by the Officers of the Army, by the members of the Ministry and by the Emperor himself, to whom he is reported to have said that France and Austria had common interests against Prussia, that sudden war was possible, and that a scheme of united action should be immediately prepared.

The French Emperor welcomed the proposition, and undertook to send a high Officer to Vienna to discuss the plan laid before him by the Archduke. On the 19th of May he summoned to the Tuileries, Le Bœuf, General Frossard, and General Le Brun, one of his Aides-de-Camp. Jarras attended in his official capacity with his maps, and the Emperor disclosed his plan. France was at peace, and war was certainly not imminent, but in case of its arising one French army advancing on Stuttgart, by Strasbourg and Kehl, would join hands with an Austrian army collected in Bohemia. A second French army from the line of the Sarre was to push on Mayence. The Archduke considered that the 1st Army, by rapidity of movement, would forestall the forces of the Southern German States, in their concentration, whilst the forces of Prussia and the Northern States would be unable to leave either the Palatinate or Hanover, which was still unsettled. A maritime expedition in the Baltic would be assisted by Denmark. The small Prussian force, available in the South, would be unable to prevent the junction of the 1st French Army with the Austrian forces, both of whom would be supported by 100,000 Italians moving from the Tyrol. The States of Southern Germany, thus overpowered, would throw off the Prussian yoke, and would once more join their lot with Austria; and Northern Germany unassisted, unsupported, and outnumbered, must surely fail.

The Archduke's scheme was admirable, on paper, and had been discussed at an earlier date by French Officers, but was it feasible? Austria required six weeks for mobilization, and Italy at least as much. The armies of Northern Germany were 900,000, whilst France could present less than 600,000, regulars and irregulars included. As the French Staff well knew, in eleven days a superior German army could block their route through Wurtemberg, and further, was the action or non-action of the Southern States assured? The diplomatists considered those States as daily less French or Austrian in their sympathies, and Prussia would strain every nerve to head the French from Wurtemberg and thus consolidate the Southern and the Northern States. For success to the scheme of the Archduke, it was essential that France, Austria, and Italy should operate simultaneously, and that the Baltic expedition should be immediately supported by Denmark. The Archduke had

stated the impossibility of this course, hampered as it would be by the moral slowness of the Austrian and Italian Chambers, and by the physical paucity of the military railroads in those countries. The impossibility was not accepted by either Napoleon, Le Bœuf, or Frossard, but that, and all parallel schemes, convinced them that for six weeks France must stand face to face and unsupported against a vastly preponderating force. General Le Brun left Paris for Vienna, but his conference with the Emperor of Austria only confirmed the former views; Austria's policy was hesitating and slow, yet the pamphlet inspired, if not written, by Napoleon III, stated that when the war of 1870 broke out, it was on the Austrian Archduke's scheme that the French Army acted: how futilely they did so, history tells! On the 6th of July, M. de Grammont made his startling announcement from the tribune in the Chamber and the Emperor's Staff was nominated. Le Bœuf was appointed Chief of the Staff, with Le Brun and Jarras as assistants; and now on the eve of war against superior forces the organization of Corps d'Armée, divisions, Staffs, and the rest of it, were discussed and altered in the military cabinet. Frossard commanded at Châlons; Niel had previously nominated him as Chief of the Corps of Engineers, and Le Bœuf wanted him to accept that post. After frequent discussions, and varying decisions, Frossard was offered his choice, and elected to command his corps. Le Bœuf told Jarras that France might count on the assistance of Austria; but his confidence gradually waned, and after Woerth he admitted that France was unaided. For the moment the Headquarter Staff were ignorant of any formulated plan, but 3 corps were ordered to mass near Metz, 1 at Strasbourg, 1 at Huningue, and 1 at Bitche, six in all, with a seventh in reserve at Châlons. The Guard were ordered to Nancy, available at need for either Strasbourg or the Sarre: but the troops had to be collected from all over France, and their concentration was difficult in all cases, and in some impossible.

War was declared on the 18th, and on the 23rd Le Bœuf preceded the Emperor to Metz: his dissatisfaction, at what he there saw, was great and increasing; the French Army was unprepared for war.

Jarras was left in Paris, and on the 24th went to St. Cloud; he there saw the Emperor in his study; whilst discussing the military situation he found to his surprise the Emperor could not read a military map! and this inheritor of the first Napoleon's name had directed an army in 1859, in 1855 had seriously contemplated assuming the command of the combined armies in the Crimea, and was an historian of Cæsar.

The following day, at dinner, the Empress, however, expressed herself confident as to the issue of the war.

On the 28th the Emperor and Jarras went to Metz, and Bazaine, just transferred from the command of the Guard to the 3rd Corps, reported himself, and as he had local knowledge of the district, the Headquarter Staff looked for elucidation of the military position from him; but he gave none, and his reserve was marked. Bazaine was a Corps Commander under the Emperor, although during the

past two years he had been mentioned as the destined Commander of a field army in front of Metz; whilst MacMahon was to command the Southern Army near Strasbourg.

Many contretemps of less or more import occurred during these few days: the Army at Metz had immediately on its arrival to indent on the stores of the garrison for supplies, and there was grave deficiency from the authorized establishments of men. Jarras proposed to the Emperor to subsidize the deficiency in the Regular Army by distributing the "Garde Mobile" among the regiments, but his proposition was not sanctioned. The political situation demanded offensive action on the part of the French, and on the 31st of July the Emperor presided at a council, of which Bazaine, Frossard, De Failly, Le Brun, Soleille, and Coffinières were members; an attack on Sarrebruck was arranged, and was carried out on the 2nd of August. Although Bazaine had been appointed to command the Army composed of the 2nd, 3rd, and 4th Corps, he took no active part during the day, and the movement was accomplished in an isolated manner by Frossard's Corps. During the evening of the 4th the news of MacMahon's check at Wissembourg was received by the Emperor, who still remained at Metz. On the 5th of August Bazaine was ordered to concentrate his three corps, but on the 6th August he left Frossard again, alone and unsupported, in his defensive position on the Spicheren heights. On the 5th MacMahon was ordered to assume chief command of the Southern Army consisting of the 1st, 5th, and 7th Corps.

The 6th Corps was not yet complete at Châlons, and the Emperor kept the Guard under his own unstable orders. On the same date as the attack on the Spicheren heights, MacMahon was beaten at Woerth, and his three corps retired in disorder towards Châlons, through the passes of the Vosges Mountains. General Jarras gives no details of either of those battles, and this omission enhances the value of his souvenirs and tends to show his careful avoidance of statements not personally in his cognizance. During the 7th, Bazaine withdrew his army towards Metz, and the Guard was ordered to his assistance, but he still hesitated to act promptly as Commander of the Army, whilst the Emperor was dallying with contradictory orders. Again, a council, the never-failing proof of mediocrity, was summoned. The Emperor recommended a retreat on Châlons for the whole of the two armies, but the Commandant of Metz strongly urged that the Northern Army should meet the Germans on the fine position 4 miles east of the town; his plan was overruled and the Army was ordered to retreat through Metz on Verdun. The contradictory instructions given to Canrobert at Châlons must have appalled that experienced soldier; he was ordered with his force first on Nancy, then back to Châlons, and finally he brought an incomplete corps to Metz. The Emperor's orders were sometimes written by his Staff, sometimes given verbally and unknown to them, hence confusion reigned supreme. Spies communicated directly with Napoleon, and he frequently issued direct orders to Corps Commanders, of which no trace was in possession of Le Brun or of Jarras, two of his principal Staff

Officers. Meantime Paris was disturbed; General Dejean, who was carrying on Le Bœuf's duties at the Ministry of War, was ousted, and Palikao, whom the English knew well in China, was put in his place; furthermore, on the 12th of August, orders were sent through the Empress to remove Le Bœuf from his post as Chief of the Staff, and to place Bazaine in absolute command. Le Bœuf accepted his dismissal, and Bazaine was appointed Commander-in-Chief of the Army of the Rhine, with Jarras as his Chief Staff Officer; from the first, Bazaine kept Jarras "à l'écart." Jarras was ordered to remain in Metz whilst Bazaine lived at Borny, a village 2 miles east of the town. An arrangement such as this was a bold offer for disaster; a Marlborough or a 1st Napoleon, hampered by inefficient subordinates, might control by his personality, but Bazaine, a commander of inferior calibre, could succeed in no great undertaking unaided by a trusted and a skilful Staff. The retreat on Verdun was ordered for the 14th, Bazaine himself giving orders to the Guard and to three other corps, whilst Jarras arranged for the movement of the artillery, the engineers, the transport, and the 6th Corps.

The march was ill-planned, and Jarras knew it, the whole of the force under Bazaine's orders, with its artillery and stores, was ordered to march by a single road as far as Gravelotte before bifurcating; there were three, if not four, efficient roads which were absolutely neglected, and Bazaine was responsible; but he, for the time at least, bore an incumbrance as great as the old man of the sea. Napoleon, though nominally surrendering executive command, remained with the Army, and the General had not only to ensure the personal safety of his Emperor, but had also to be in constant communication with him. Affairs daily grew worse in Paris; both the Empress Regent and Persigny stated, plainly and truthfully, the Sovereign could not return to his capital except as a victorious monarch. Hesitation was no longer possible; German scouts had visited Briey, some 10 miles north-west of Metz. The 3rd Corps was still at Borny, with the Guard in support, and one division of the 4th Corps at Fort St. Julien; the rest of the Army had crossed the Moselle in retreat. The 1st German Army, under Steinmetz, attacked, and the remaining divisions of the 4th French Corps recrossed the river to the support of their comrades. At nightfall, Bazaine ordered the original retreat to be continued, but the Guard alone assumed their allotted bivouacs near Longéville, west of Metz. The 3rd and 4th Corps, from fatigue or other reasons, remained east of the river. Jarras appreciated the strategy of the Germans in the battle of the 14th; it is true they failed in driving back the French troops opposed to them, and they had sustained such heavy losses that their General was shortly sent home, but the French concentration on the Gravelotte plateau was impeded, and time was afforded the Germans to threaten the retreat on Verdun.

On the morning of the 15th the 2nd and 6th Corps were moved on Mars-la-Tour and Rézonville, and the Guard on Gravelotte; orders were issued to the 3rd and 4th to remain at Vernéville and Doncourt, but to those places they could not attain, the roads allotted to them

were blocked by wagons of all sorts, and the Briey road was reported as being threatened from the north.

At 3 in the afternoon Bazaine started for Gravelotte, where he found the Emperor; during his ride he saw the Guard Corps marching in single file either side of a road occupied by hired transport; this latter he ordered back to Metz, against the wishes of his Commissariat Officers, but necessity, according to Jarras, forced this ship-burning process on the Commander-in-Chief.

The advanced guards of the 2nd and 4th Corps found German troops in Mars-la-Tour, so their main bodies camped at Rézonville. The Guard reached Gravelotte; some of the 3rd Corps reached Vernéville, but the main body was still "en route," whilst the 4th Corps remained unable to cross from the right bank of the Moselle.

At 3 in the morning the Emperor escorted by two brigades of cavalry left for Châlons, there to await the arrival of his armies. The morning of the 16th of August found the 4th Corps at Sansonnet, close to Metz, and two-thirds of the 3rd Corps were still marching towards Vernéville. Bazaine countermanded his previous orders, on account of the scattered state of the forces, but warned the troops that the retreat would be continued in the afternoon. Frossard, although his memory failed him at the court-martial, wrote in the early morning that 4,000 Germans, without artillery, were in front of Gorze, and Canrobert reported that his patrols had found no enemy, although the ravines had been searched. Forton's cavalry division at Vionville had also failed in getting touch with the invaders. At 10 A.M. Forton's camp was shelled; the 2nd Corps hastened to their arms, and Bazaine, with just appreciation of his position, ordered the Guard and the reserve artillery to Rézonville.

The contradictory evidence given before the Conseil de Guerre make an accurate rendering of the French movements an impossibility; but the German Staff account, and other sources, leave little to be known. Bazaine showed great personal courage, and remained in the firing line of Frossard's corps; his light field batteries being overpowered by the heavier German guns, he brought into action guns from the reserve. About 2 in the afternoon Bazaine launched two cavalry attacks against the advancing Prussian infantry. The attack of the Lancers failed, but the Cuirassiers of the Guard made a gallant onslaught against the scattered companies of the 10th Infantry Brigade; the fire was murderous, and the Cuirassiers lost in a few minutes 22 Officers, 208 men, and 243 horses. A German counter-attack, by the Brunswick Hussars, completed the rout of the French cavalry, who carried back with themselves the advanced companies of their own infantry, and scattered Bazaine from his Staff. Endeavour was made to follow up this success by an attack of the 6th German Cavalry Division, but the ground was unsuitable, the infantry fire intense, and the attack failed. Frossard's 2nd Corps, roughly handled at Spicheren, had borne the brunt of the German attack for many hours on the 16th, and Bazaine sent the Guard to relieve them between 3 and 4 o'clock, during a cessation of fire, but it was a lull

only, and firing reopened on the French left about 5 and continued till dark.

About 3 P.M. the portion of the 3rd Corps under Le Bœuf had prolonged the French line to the right, and the 4th Corps, which Ladmirault moved from Sansonnet when the firing began, drove the Germans from Mars-la-Tour before dark. The French bivouacked on the battlefield. The roads near Rézonville and Gravelotte were thick with squandered soldiers, and Bazaine, with difficulty, forced his way, at 10 at night, to his quarters at Gravelotte.

The position was grave, but not impossible: the French had held their ground, and Bazaine was ignorant of the overpowering numbers of Germans within practicable distance. The Commanders of the Guard, 2nd and 6th Corps, were in communication with him. It was agreed that a direct flank march on Verdun was dangerous, but a more northern route was open. Bazaine, at 11 o'clock, wrote his now celebrated order, withdrawing his troops to the hills running north and south, but close to Metz, in order, as he said, to replenish their stores and ammunition.

The 17th was spent in taking up their allotted positions, facing west, the 2nd Corps on the left near Rozerieulles, the 3rd near Châtel-St. Germain, the 4th at Montigny la Grange, the 6th was ordered to Vernéville, but Canrobert objecting, he was placed at St. Privat-la-Montagne, the Guard camped between Plappeville and Lessy. The cavalry division of the 6th Corps had been left at Châlons, and a brigade of the 3rd Corps was sent to Canrobert in their place. The cavalry division of the 4th Corps guarded the Thionville railway, and Forton's division and the cavalry of the 2nd Corps, camped near Rozerieulles, were ordered to reconnoitre the left bank of the river southward from Moulins. As Jarras said, the left was strong, but the right was weak, and the entrenching tools of the right corps had been left at Châlons. From the spire of Metz Cathedral constant streams of German troops were seen, during the 17th, crossing the Moselle at Ars and Noveant, all heading for the plateau of Gravelotte.

At 9 o'clock on the 18th the French Corps Commanders reported the enemy as being in motion in front of the position. At noon the 2nd Corps was attacked, soon afterward the whole four corps were engaged. The left of the line, and the front, held their ground, but the poorly-entrenched right corps was turned, and retreated, thus forcing a conforming movement on the 4th and 3rd Corps.

Bazaine only left his quarters at 2 o'clock, and posted himself, first at St. Quentin, then at Plappeville. He received demands from Ladmirault for infantry support, from Canrobert for both infantry and artillery, as his reserve artillery was still at Châlons with his engineers and cavalry. Bourbaki and the Guard were impatient in their reserve positions, but Bazaine sanctioned no change till evening, when one light brigade from the Guard was moved towards the 4th Corps. The reserve artillery remained unemployed at Ban-St. Martin, Forton's cavalry and the Guard cavalry were in bivouac the whole day.

At 7 o'clock Bazaine returned to his quarters, and expressed him-

self satisfied with the events of the day, although his right was turned and his reserve of the three arms had been unemployed.

New positions were allotted during the night by the Commander-in-Chief, and they were speedily assumed. The 6th Corps formed line facing north from close to the Isle Chambière to Coupillon, the 4th from Coupillon to Lorry, and thence to Lessy, the 3rd was on an arc round St. Quentin, and the 2nd occupied Chazelles and Sey, and rested on the river at Longéville. The Guard was in rear of the 6th and 4th Corps, and headquarters were at Ban-St. Martin.

Jarras was in Plappeville during the battle of the 18th, and heard but intermittently the sound of guns; Bazaine gave him little or no information, even if he had any to give, and up till 9 in the evening the Chief of the Staff thought Canrobert had held St. Privat; at that hour a Commissariat Officer reported that his convoy, whilst journeying to St. Privat by the high road through Woippy, had been stopped and disordered by wagons and horsemen flying from the field of battle. At the same time two Staff Officers, one from Canrobert and one from Ladmirault, came to Jarras, who conducted them to Bazaine. They reported that the 6th Corps had entirely abandoned its position, and, in consequence, the right of the 4th Corps had retreated. They demanded instructions as to new positions. It was clear that the right of the French had met with so grave a check that the results might prove serious. Bazaine, in an unmoved manner, pointed on the map to their new positions, and said, under any circumstances, this movement would have been made the following morning; the only alteration caused by the events of the day was that the movement would take place somewhat sooner. These positions had been surveyed by Colonel Lewal, of the Headquarter Staff, during the day. Bazaine's expressed confidence in the strength of the Amanvilliers position was strongly at variance with his action, in having a position reconnoitred close home to the forts of Metz. But Jarras frequently found Bazaine inconsequent and changeable, and he gives no credit to a Machiavellian idea fathered on Bazaine, to cut himself and his army completely adrift from the Emperor. He was not a born commander, and the circumstances in which he was placed were altogether beyond the scope of his intellect or his education; in the absence of military information he elected to let matters drift; the general course of feeble minds. It would have taken a man of different calibre from Bazaine to raise the *moral* of the Army of the Rhine.

Such men are rare, but Jarras considers Pélissier to have been of this class: he formed his plans, and told his subordinates to do their best to carry them out; as an instance of his determination, on the 7th June, 1855, he received a dispatch from the Emperor, forbidding him to attack the Mamelon fort; he was mounting his horse to direct the attack as he received it; he showed the message to his Staff, and said, "Now for the attack of the Mamelon;" he received tardy congratulations on his success from the Emperor, but after the fall of Sebastopol Napoleon thanked him for the firmness he had shown. On the 18th June the French lost 8,000 men in the attack on the

Malakoff. Pélissier said, quietly, to Lord Raglan, "Eh bien, milord, c'est à recommencer." Letters were constantly being written from the Crimea complaining of Pélissier's autocracy, and at one time the Emperor had actually signed his recall; but luckily this was revoked, and it was owing to Pélissier's firmness that Sebastopol was stormed on the 8th of September.

The Army was in its new positions on the 19th, many things lost or destroyed during the battles of the 14th, 16th, and 18th were replaced from the garrison stores, but these soon become impoverished, and it was sought to replenish them by articles made in the town.

The Chief Commissariat Officer told Jarras he had been preparing stores on the route to Verdun, most of which were now lost, as a matter of course; Jarras, although Chief of the Staff, had not been previously informed of this fact.

Early on the 19th flags of truce were employed, the release of wounded prisoners and the exchange of unwounded ones was discussed, and the French found it stated in German newspapers that fell into their hands, that the German Army, 250,000 strong, under the King of Prussia's personal command, had lost 18,000 killed and wounded in the last day's fight. The French reckoned their own loss much lower, and Jarras considered their *moral* satisfactory.

The first consideration was food, and the Intendant found a month's store was about the total for the whole Army, but there was only fifteen days' fodder for the horses. Bazaine expressed himself anxious to keep the men fit for the field, and refused to diminish the rations.

Artillery stores and ammunition were being prepared in the town, which was encumbered with 18,000 wounded men, the proceeds of the actions of the 14th, 16th, and 18th. The baggage trains were reorganized and diminished. The defensive works of the forts themselves were made good. The light field batteries were replaced by heavier guns, whose stores of percussion fuses were largely increased. The 3rd Corps worked at the forts on the right bank from St. Julien to Montigny, leaving one division in front of St. Quentin. The 2nd and 4th Corps completed the Forts St. Quentin and Plappeville, and a complete division of the 2nd Corps garrisoned the forts.

The Commander-in-Chief ordered the bridge over the river below Metz to be restored, as he expressed his intention of forcing his way out by the right bank to Thionville, and there recrossing to get back to the interior of France.

Special Officers were selected to organize partizan corps for the purpose of giving information of the enemy's position and troops. Bazaine subsidized their efforts by sending Officers who spoke German with flags of truce ostensibly in regard to the exchange of prisoners, but really to note the numbers and the uniforms of the Germans, so as to satisfy themselves as to the location of the different corps. This surreptitious mode of gaining information ceased from 1st September, after which date no "parlementaire" was allowed by the enemy except on the road from Moulines to Ars. From this date no information was received except by spies; and by them even it

became daily more difficult and uncertain. But Jarras received a letter on the 30th August from the Governor of Verdun. Great care was demanded in regard to those men who were suspected of serving both sides; but on the 21st October two men got away, who took letters which safely reached the Government of National Defence. Generally they failed in getting through the German lines, though some got into them and returned; a few balloons were sent up with letters, some of which fell into German hands, but the majority crossed the besiegers and their communications, and passed to their destinations.

The Marshal declared openly and constantly his intention of forcing his way from Metz. On the 19th August arrangements were made by which the troops had certainly three days' provisions available, and on the morning of the 25th they were ordered to be ready to start at any moment; on the evening of the 25th positive and detailed orders were issued. The 2nd Corps, after crossing the town, was to take position, its right on the Sarrebruck road, its left near Vantoux. The 4th Corps, crossing by bridges thrown below the town, was to move in front of Grimont. The 6th Corps was ordered to follow and make good the ground north of Grimont to the Moselle. The 3rd Corps, already over the river, was to move between the 2nd and 4th Corps. The Guard to follow the 6th Corps, and to be in reserve to the 4th.

The 2nd and 3rd Corps on the 26th moved according to orders; the 4th, late in starting, blocked the 6th and the Guard; nevertheless all corps were in position by noon, except the Guard which was only then crossing. Bazaine started at 11.30, and was at Grimont at 1, and sent for the Corps Commanders, saying to Jarras, "Que vont-ils me dire?" Jarras said, whatever the opinions of the Corps Commanders might be, it was clearly for the Commander-in-Chief to decide; at 1.30, in torrents of rain, the Corps Commanders, with the exception of Bourbaki, arrived.

Bazaine declared his intentions of gaining Thionville by the right bank, and then recrossing to gain the north of France, near Montmédý. The Council of War, as usual, decided not to fight, for various reasons; according to Jarras, the Corps Commanders were practically unanimous; Coffinière's opinion of the weakness of some of the forts, especially of Queuleu if the Army was removed, had great weight. An order was framed for the troops, deferring the sortie on account of the weather. The 2nd Corps moved south of the town along the railway embankment, from the Seille to the Moselle. The third from the Seille to St. Julien. The 6th in its old position between Coupilon and the Moselle, the 4th on a long arc round Plappeville and St. Quentin and back to the river, and the Guard and reserve artillery near Plappeville, St. Quentin, and Ban-St. Martin. The Marshal returned to his quarters, and the weather immediately cleared; his baggage carriages had not moved.

Jarras was present at the Grimont meeting, and it is clear on the point that Bazaine, though cognizant on the 23rd of MacMahon's move eastwards, told nothing of it to the Corps Commanders, or

probably their opinion as to the attempted sortie would have been different; it was only on the 31st that Jarras and the Corps Commanders heard anything of the movement. There was discussion on this point during the Bazaine court-martial, but the evidence was overpowering that neither Bazaine nor Colonel Lewal had conveyed the information, in their possession on the 23rd, to any of the responsible members of the Council of War on the 26th.

Jarras goes into long detail about the stores of ammunition, but with a hesitating leader, the amplest stores would have been useless, and it would be but a crop of Dead Sea fruit to enter into this detail at this time.

The question of recrossing at the one bridge of Thionville was strategically serious. The Germans, with superior forces, were on a shorter line to the western side of that town, and the strategical position was terribly against the French if the Thionville plan had been followed.

In all this discussion MacMahon's army was not considered: those who had seen them in retreat after Woerth were convinced that it would be long before they were reorganized morally and physically to stand against their previous victors, and this eventually proved to be MacMahon's opinion, for he hesitated before initiating his march on Sedan, and then moved under the strongest political pressure. Jarras considered more chance of success would have attended the attempt to break out southwards, towards Château Salin and the Vosges, and this he said to Bazaine on the 26th. For a moment, he hoped his ideas were accepted, as the Marshal made inquiries about Courcelles-sur-Nied and other places on the road, but he moved no further. Whether Jarras' proposition was possible, at so late a date as the 21st, is open to doubt, but generally the strategy he advocated has been approved by two such men as Von Moltke and Hamley, and by many other military writers. As soon as the troops were in their new positions every endeavour was made to prepare them for an assault on the enemy's lines, but each day the position grew worse: the French were consuming their provisions, and the German field works were being strengthened; at St. Barbe, for instance, a strong and growing battery was visible on a dangerously commanding site. Partial attacks, for foraging purposes, were constantly being made by the French, with little or no result. During the morning of the 30th the troops had three days' provisions issued, and in the afternoon news circulated that MacMahon was marching towards Metz; roads were prepared to the three bridges of the Chambière, and the same orders as on the 26th were issued, except that the 2nd Corps were already east of the river. At daybreak on the 31st the 4th and 6th Corps moved off, the routes across the Chambière being marked with flags, different in colour for the different corps; yet clashing occurred, and at noon the Guard was still on the left bank waiting for the bridges to be cleared. The reserve artillery did not reach their position till 6 in the evening. At least one General and his Staff forced the sentry on one of the bridges which was detailed for another corps. At 1 the Corps Commanders again met at Grimont.

Bazaine explained that MacMahon, coming from Châlons, was on the Meuse in the Ardennes. The Metz Army was to move by the right bank on Thionville, as before ordered. The 3rd Corps supported on its right by the 2nd was to carry Noisseville on the Sarrelouis road. The 4th, followed by the 6th Corps, was to attack St. Barbe, and then the whole Army, changing direction slightly to the left, was to move on Thionville. Le Bœuf was to start the 3rd Corps on a signal from Bazaine, who went in advance of the skirmishers of the 4th Corps to a position 700 or 800 yards from Villers-l'Orme, and there he ordered an épaulement for a battery to be immediately constructed, thence to Grimont, where another battery was prepared for three large guns from St. Julien. At 4 Bazaine fired his signal gun. The movement was apparently successful. The 4th and 6th Corps conformed to the attack of the 3rd, and at nightfall the French were in possession of Noisseville, Servigny, and Villers-l'Orme. Nevertheless the French movement was completely visible to the enemy, and reinforcements came towards Noisseville and St. Barbe. Some crossing the Moselle below Metz, and much larger bodies from above. A German night attack, in great force, drove the French out of Servigny. A thick fog early on the 1st of September prevented action, but at 7 the French renewed their attack, which was everywhere defeated, and the retreat was ordered to their original bivouacs. During the battle of the 31st, and till 10 at night, Bazaine was with his troops, and then, considering no further action would occur till daylight, he retired to St. Julien; he sent out his orders on the morning of the 1st of September to continue the advance, but the retreat had begun on one part of the line, so the whole were ordered to conform.

During the two days, the 3rd and 4th Corps were principally engaged, only one division of the 2nd entered into the action, a few skirmishers of the 6th Corps fired, but the Guard did not fire a shot. The cavalry did not move, although the artillery of the 3rd and 4th Corps, and some batteries of the Reserve fired heavily. It has been said that Bazaine had no real intention of breaking out; Jarras, the Chief of his Staff, states that neither before nor after the 1st of September had he any categorical information as to Bazaine's intentions, but his procrastination in personally remaining in Metz till 11.30 on the 31st, and then assembling the Corps Commanders at Grimont, so that no action commenced till 4, were all condemnatory courses. He clearly ought to have given his detailed instructions over night. Had the arrangements been detailed and the assault begun earlier, Jarras considers that the Metz Army might have reached Thionville that night, more especially as later information showed that Prince Frederick Charles retained the bulk of his forces west of Metz, ready to support the action against MacMahon. But had Bazaine reached Thionville his route was assured no further; he had still to gain Montmédy, Mézières, and Sedan, on his route to the interior of France. Thionville could supply but small quantities of food and ammunition, and no position could last at that place. Want of food would have forced the Army to push forward, and the Crown Prince's and Prince Frederick Charles' armies would have been on their

route. Howbeit Bazaine was committed to the Emperor, and to MacMahon, to work northwards on towards Châlons, and therefore by his engagements the southern march to Luneville, Château Salins, and the Vosges was debarred to him. The Government at Paris had ordered MacMahon from Châlons towards the Meuse to second the plan proposed by Marshal Bazaine: if this is true Bazaine was responsible for an impossible design.

After the abortive attempt Bazaine was loud and frequent in his complaints of the action of the Corps Commanders, but his own faulty and equivocal dispositions ought to have borne the blame of the miscarriage. In fact, the intercourse between the Commander-in-Chief and his subordinates, whether Corps Commanders or his own Staff, was absolutely without confidence on one side or the other. The command being weak, the less high Officers, such as the Governor of the town, the Corps Commanders, and the Headquarter Staff, found their duties helplessly overlapping. This ill discipline must have reacted with disastrous effect on his subordinates. Jarras was anxious to resign his appointment, but his sense of duty kept him in his nominal position till the final catastrophe. It is curious to read that Bazaine gave decorations and promotions to some Officers of the Staff after the failure of the sortie.

Frossard was asked to study a possible attack on Mercy-le-Haut, and on the 3rd Canrobert was requested to drive the enemy's Grand Guards from Ladonchamps; neither instruction was carried out, and Bazaine lamented continuously the want of support he received. His personal action certainly did not bid for success.

On the 3rd of September a Staff Officer from Metz, who had gone to the German outposts about an exchange of wounded prisoners, brought back word of the surrender at Sedan. The news was emphasized by the cheering of the German soldiers, but it was not divulged to the Army generally till, two days later, a couple of French soldiers reported themselves as having escaped from Sedan after capture. On the same day (the 5th) the look-outs saw long columns of dust passing from west to east, south of Metz. Rumour had it that the German Army was retiring in defeat; only on the 7th was it accurately known that the long column raising the dust was convoys of French prisoners.

Directly after the fight of the 16th and 18th, Bazaine, in order to save food, sent 1,500 German prisoners to their friends, requesting the release of an equal number of Frenchmen, but all the Frenchmen had been passed on to the interior of Germany. On the 7th, 750 Frenchmen were passed in from the German outposts, none of whom had fought round Metz, but all had been captured at Sedan, and selected from different infantry regiments in order to convince Bazaine of the full extent of the French defeat. The prisoners whilst in German hands were not allowed to cross the Moselle, but were sent up from Ars, and they brought full particulars of the battle of Beaumont and the surrender at Sedan. Great consternation spread through Metz, which gave place to anger when, shortly afterwards, another batch from Strasbourg was sent in. These brought news of the bands

of franc-tireurs in the Vosges, and of the raising of a Southern Army. On the 18th a Lieutenant-Colonel of cavalry had been sent to Metz in exchange, after surrender at Sedan and return from Mayence. Of course his detailed account of the 1st and 2nd of September was of great importance. Bazaine had heard on the 10th of the fall of the Empire and the establishment of the Republic, which was proclaimed throughout France on the 4th; he assembled his Commanders on the 12th, and gave instructions that no serious operations were to be undertaken till after communication with the Central Government.

A civil servant named Debains tried to pass out under a false name, but he was detained at Ars for a whole day, and then returned to Metz. He read several journals during his detention, and put the pith of them into Bazaine's hands. His memorandum was as follows: "600,000 German soldiers were on French soil; the only existing French Army is in Metz; no satisfactory enthusiasm for national purposes in the invaded provinces; a complete union of all Germany for the national cause; discussion postponed till after the war as to the form of German Government; no chance of armed intervention by Austria; Austria and Russia moving diplomatically for peace, but no actual bases mentioned to Prussia; great efforts against Paris by the enemy; Metz to remain in the background for the present; bombardment probable in six or eight days on the arrival of heavy artillery."

After long discussion the gist of this note was confidentially transmitted by Bazaine to his Generals. Discussion as to the new form of Government was partial among the Officers. The staunch Imperialists were silent, and the Liberals only declared their approval. The Marshal avowed no political opinion, but expressed his intention of awaiting communications from the *de facto* Government. He was anxious to keep the Imperial Guard in his interests, and so continued their extra pay. The Army in general avowed sentiments of patriotism and of discipline. One incident was remarkable in Canrobert's corps; some sub-officers, promoted Officers, were sworn in, and, instead of saying "in the name of the Emperor," some said "in the name of the French people," some "in the name of the French Republic," some "in the name of the Government of National Defence." At a conference of the senior Officers it was determined to still use the phrase "in the name of the Emperor." The civilians in the town were more exercised by Republican views than the soldiers, and the journals were turbulent, and as Bazaine did not interfere and the Government of the town would not act, the growing dissatisfaction of the Press eventually affected the discipline of the Army. During the whole of September partial sorties were discussed, but none were carried out, and in the middle of the month difficulties arose with the townspeople about the price of provisions.

By the 22nd of September the cavalry and artillery horses were becoming inefficient, but the men were well nourished; horse flesh was regularly and largely issued. On the 25th General Desvaux was appointed to the command of the Guard in place of Bourbaki, *en mission*. Jarras' view of this curious event was as follows:—Since

the failure on the 31st the enemy's works were being constantly increased, and no news of a private or official nature reached Bazaine; the leaguer was complete. It was unknown how far the new Government had been accepted in the Departments. Bazaine communicated from time to time with Prince Frederick Charles, but received only mutilated newspapers in response, and his Aide-de-Camp, General Boyer, was refused an interview. Jarras heard some days after the occurrence that an emissary had been passed through the lines on the 23rd, and taken by General Cissey direct to Bazaine. The messenger went back on the 24th, and returned to Bazaine on the same day; he told the convoying Officers that France was in anarchy and that an Imperial Government alone could save it. After an interview with Bazaine, Bourbaki, and Canrobert, Regnier, the mysterious messenger, returned on the 25th to the German outposts with Bourbaki, then dressed in plain clothes. Bazaine gave varying accounts of Bourbaki's mission, but Jarras justly considered that Regnier, the messenger, would not have been allowed to pass the German lines except in the interest of the German Army.

Bourbaki left Metz in company, not only with Regnier, but also with half-a-dozen surgeons belonging to the National Association of Geneva, whose departure had, up to that time, been refused by Bazaine. Prince Frederick Charles refused Bourbaki permission to re-enter Metz after the failure of his mission, but by express order of the Prussian King, he was released, and took service in the North under the Government of National Defence. During the days following Bourbaki's departure, preparations were ostensibly made for a movement on Thionville by the left bank; baggage trains with much diminished horse-power were allotted to each corps, and on the 3rd October, two days' biscuit and the last ration of bacon remaining in store was issued to the troops; meanwhile, on the 27th September, a dashing attack had been made on Peltre by the 3rd Corps, and the whole German garrison was captured; the 6th Corps attacked and captured the château of Ladonchamps, but retreated in the evening, and it was only permanently in French hands after 2nd October. The 3rd Corps raided the village of Colombey. From the 2nd to the 26th September, Staff Officers were constantly on the look-out from the top of St. Quentin, but on the latter day they were discontinued from that duty by Bazaine's direct orders, and on the 29th September a German Officer informed the Captain of an outpost at Moulins les Metz that Toul had capitulated on the 25th and Strasbourg on the 28th.

From the 30th September, fifty horses a day were issued from the Army for food to the civil population. On the 4th October the Commander-in-Chief again summoned the Corps Commanders and explained the situation; food and *moral* were both diminishing; an attempt to break out was necessary, he proposed a scheme by which Thionville was again made the objective, the 6th Corps and Guard were to keep on the left bank of the river, with the 4th Corps on the heights parallel to their line of march; the 3rd Corps was to advance on the right bank; lastly, the 2nd Corps were to act as rear guard.

Bazaine gave no orders but asked for opinions on the proposed scheme: Le Bœuf explained his position was arduous, being separated by the river from the main Army, his flank and rear attacked, his position would be disastrous, but he expressed his readiness to obey orders. Bazaine said all schemes were dangerous under the circumstances; if his was not approved, the Council was requested to suggest another. No discussion followed and the plan fell through. On the 7th October, Canrobert raided Les Grandes et Petites Tapes; the voltigeurs of the Guard were attached to his corps; his advance down the valley of the Moselle was to be supported on the left by the 4th Corps, who were to occupy Saulny and Vigneulles, and on the right bank Le Bœuf was to advance to Chieulles and to attack Malroy from that place. The troops, unencumbered by packs, were to gather forage reported to be stored in the farms at the Tapes, but though the Guard behaved well, nothing was gained to compensate for the loss of life. Bazaine watched the attack and concluded a sortie in force was impossible on that line, and remarked that Canrobert had been ill supported on either flank. Bazaine constantly repeated he would make a desperate sortie rather than surrender, but his plans for so doing inspired no confidence. Nevertheless, on the 9th October the rations for the soldiers were still $\frac{3}{4}$ lb. bread and $1\frac{1}{2}$ lbs. of meat; but the end was visible; the commissariat reported only two days more grain in the stores, and on the 10th another council was held at Headquarters. The three questions were, the food, the military question, and the political one. By foraging in the town, food might be counted on till the 16th. Coffinières, while admitting the mischief done by the journals, declined to control them, and explained that no great amount of food was stored in the town. The Corps Commanders represented that without the labours of the field army the forts would still have been unfinished, and the town would have been bombarded, and these matters must be compared with the value of the six weeks' food, already received from the civilians for the army.

The military question was clear; what had been impossible on the 31st August was hopeless now; the enemy's earthworks and armaments were stronger, the French artillery and cavalry were horseless.

As to a further political discussion, some sanguine spirits expected the Germans would allow freedom of movement for the Army, with a view of awing the anarchism in France, the more especially as Europe wanted peace, but Jarras expressed doubts as to the Army, even if liberated, acting against a republican and popular Government.

Bazaine proposed to communicate direct with the King, to give freedom to the Army, its arms and its baggage, with the object of restoring peace under an Imperial Government, and this was approved by the Council, with the reservation that failing acceptance on these lines, a sortie was to be made with all forces.

General Boyer was instructed to endeavour to gain audience of the King at Versailles, and received a pass from Prince Frederick Charles on the 12th; Bazaine can hardly have hoped for success in this mission, as, after a *séance* on the 12th with the senior Officers, he sent, early on the following morning, for Jarras, and discussed a new attempt to

force a way out southwards, in three columns, along the road to Strasbourg, to Noumény, and to Coin-sur-Seille. The earthworks of the Germans on these roads were shown on large-scale maps, drawn from observations and from the reports of spies; though not absolutely accurate, they were faithful to a large extent; but Boyer's mission at Versailles was hanging fire, and food supplies were rapidly diminishing at Metz. Boyer returned on the 17th, and, after a private report to Bazaine, the Commanders were called together on the 18th, and Boyer explained he had had two interviews with Bismarck, who told him of the anarchy in France; the Government installed in Paris and at Tours had no power in the departments; desperate men ruled in Lyons, Marseilles, and other places, some of which begged for Government troops to preserve order. Boyer had seen the French National Guard keeping order in Versailles; Rouen had been occupied at the request of the inhabitants: no organized troops existed in France; regiments returned from Italy and Algeria, and, made up to 40,000 strong by Gardes Mobiles, had been scattered near Artenay and before Orléans: Paris still held out, it was true, but it had not been assaulted; and St. Cloud, though destroyed, was destroyed by the guns of Fort Valerien. Bismarck approved Bazaine's idea, but wanted guarantees which he could not give, and which could only be given by the Empress, as regent. But a success by arms was now impossible, and the Commanders were anxious to endeavour, by any means, to extricate their army from the horrors of famine. The political question, however, was obscure. Could the Army be depended upon to obey their chiefs? The majority of those chiefs affirmed their belief, and, after a heated meeting, it was decided, on the 19th, to send Boyer to the Empress. Changarnier spoke at the meeting, though, at 75 years of age, he was not an Officer on active service: and it was, perhaps, his oratory that influenced the meeting. Desvaux (commanding the Imperial Guard) said the Army was bound by its oath to the Empire, and could not act against Imperial interests till relieved from its oath. Ladmirault spoke of his own devotion to that cause, but somewhat distrusted his men. Canrobert and Soleille agreed—without making any speeches. Le Bœuf and Coffinières doubted the Empress acting in the matter. Frossard wanted the Empress to come over to the Army. It was thought that Boyer had given a Prussian view of the state of France, and that he had received his estimate of the Tours Government through Bismarck—voluntarily or involuntarily. Boyer started on his mission the same day (19th), and, on the 23rd, Bazaine received a letter from Prince Frederick Charles, saying Boyer's mission had failed.

Bazaine assembled the Commanders yet again (on the 24th), and read a telegram from Bismarck, relating the insuccess of Boyer's journey to the Empress: the Army had no future through diplomacy, their only chance was through force. "Que faut-il faire?" was the Commander-in-Chief's final sentence. An angry discussion ensued, many present abusing Coffinières for not having provided more food from the town.

Since negotiations had been opened, desertion had increased: the *moral* of the Army was being sapped; the Officers expressed patriotic sentiments, but they differed among themselves in political opinions: some being Republicans, and others staunch Imperialists, among whom, as might be expected, was the Commander of the Guard. Ladmirault was ready to obey orders, but admitted that the troops were no longer fit, morally or physically, for heroic efforts. Frossard, Canrobert, and Soleille less openly avowed the same sentiments. Le Bœuf was anxious to try a sortie, but he admitted it would be "une héroïque folie."

Coffinières wished to treat the garrison and its forts on a different footing from the field army, of which the infantry alone was a valid force; both cavalry and artillery were practically horseless. The enemy's earthworks were now so complete, that all routes were blocked, and the general opinion of the meeting was in favour of treating with the Germans. Bazaine doubted the Army receiving any better terms than had been granted at Sedan, and considered that the Germans would only consider the garrison and the army under one heading. The venerable General Changarnier undertook the thankless task of entering into negotiations with Prince Frederick Charles, on the footing of the army and the forts being separately treated: the army to refrain from action against the Germans, and serve in France or Algeria in the interests of order alone, the forts and their garrisons to remain intact. At the conclusion of the *séance*, Bazaine wrote to Prince Frederick Charles, and it was agreed that Changarnier should go to the Château de Corny at 11 A.M. on the 25th. He returned in the afternoon; the terms were absolutely refused; but a German General would be at Frescaty at 5 P.M. with an ultimatum. General Cissey met him, and brought back the only terms the Germans would grant, which were a complete surrender of the forts, arms, and army, all members of which would be prisoners of war.

On the morning of the 26th the Generals in assembly were informed of these terms by Bazaine: Changarnier and Cissey reported that they had been courteously received, but Prince Frederick Charles and his Chief of the Staff were resolute as to the terms. Food was an absolute necessity, and there was nothing but horseflesh left, and but little of that, in the Army stores, though the garrisons of the forts were slightly better off. A discussion was fiercely carried on as to disabling the arms and wetting the powder, but the majority of the Council decided that this would be a dishonourable course. Jarras, though not being allowed to speak, dissented, but he was appointed, nevertheless, after grave remonstrance on his part, to sign the Convention as Chief of the Staff. In answer to Bazaine's letter Prince Frederick Charles appointed Frescaty at 6 P.M. as the place and time for the interchange of plenary powers. Jarras went, accompanied by two Staff Officers, both fluent German speakers; at 8 they arrived at Frescaty, and were received by Stiehle, Chief of Staff to the German Commander, who refused in any way to separate the lot of the Army of the Rhine from that of the forts, which they,

in fact, had made efficient, and to which they had voluntarily attached themselves. He also refused to allow any troops to go to Algeria, as their passage across France might have raised the country. A long discussion took place about the Officers retaining their swords, which was refused by direct orders of the King, owing to a General having broken his parole from Sedan; however, Stiehle, during the interchange of written documents, undertook to telegraph to Versailles, and this point was left blank for the present. Frossard had instructed Jarras to keep from surrender if possible the machinery, books, and records of the Artillery Institute, but his application was unavailing. Jarras returned at 3 A.M. the 27th, but Bazaine would not see him till 9.30, when he received a full account of the past night's proceedings.

At 2 P.M. Jarras was informed that the "honours of war" were sanctioned for the Army, but as this entailed a marching past of Officers and men, Bazaine, in agreement with Canrobert and Le Bœuf, refused acceptance; nevertheless, the Officers were permitted to wear their swords, in recognition of the courage and skill shown by the French Army. Bazaine gave further instructions to Jarras about the standards, some of which had already been destroyed, and he was commissioned to go forthwith to the German lines to conclude the Convention.

At 5.30 he met Stiehle, who was astonished at Bazaine's proposition that the colours should be destroyed, and that the Commander-in-Chief should not parade at the defile of the troops. Stiehle explained that food and straw for bedding had been for three days past at Ars. Jarras signed at 10.30 P.M. on the 27th, and returned at once to Ban-St. Martin. On the 28th the Generals were informed in full detail, and the surrender was ordered for the next day (29th). During Jarras's absence Bazaine ordered all the colours to be brought to the arsenal for destruction, and erased the order from the order book on Jarras's return. During the afternoon of the 28th a letter was received from Stiehle, saying Prince Frederick Charles recognized no right on the part of Bazaine to destroy the eagles when once the Convention was signed, and requesting immediate information of how many colours remained undestroyed, and where they were placed. Bazaine told Jarras to answer that it was the custom in France, on change of Government, to destroy the old colours, but that forty-one still remained in the arsenal at Metz. Bazaine verbally altered his rough draft of the letter, and Jarras sent a fair transcript as altered to Stiehle. Bazaine, at the court-martial, denied having sent the letter, till confronted with the rough draft and with his own corrections, and then said he had forgotten all about it. Jarras's opinion was that the colours ought to have been left with the regiments, who would have destroyed them, as they did at Sedan, without the enemy's attention having been brought to the matter. If any action had been taken he would have recommended an absolute order, to all concerned, to destroy the colours and arms, and to flood the magazines before signing the Convention, as is ordered by the French Regulations, which bear great weight, as being the product

of long war experience. The day of the 28th passed quietly except in the town, where a mob had to be dispersed by the Guard. General De Cissey reported in the evening a projected rising, headed by certain Officers, with a view of breaking out, but precautions prevented anything but a partial attempt, which completely failed.

Bazaine went in the morning of the 29th with his escort to Longéville, and Jarras saw no more of him, though he received a letter, saying Prince Frederick Charles would receive the Marshal at either 5 that evening or at noon on the 30th. The Staff orders were regularly issued up till noon on the 29th, the time arranged for surrender, and at 8.30 on the morning of the 30th, Jarras quitted Ban-St. Martin to go to Frankfort-on-Main, the town appointed for his residence, as prisoner of war. At the Conseil de Guerre it was stated that the Staff had made inefficient arrangements for rationing the troops during the last few days, but Jarras affirms stoutly that orders were issued on the 26th for field army and garrison to share alike, and, unless in some small detail, this was carried out, otherwise the Corps Commanders would have reported the circumstance. Stiehle had given Jarras assurances that rations and bed straw were ready at Ars, but there was some hitch among the subordinates, and the stores were only partially utilized.

Bazaine said at his Court-Martial that he never had the archives of his Staff in his possession, which was true, and that Jarras had carried them off, which was false; as a matter of fact, they were placed in the Jesuit College, and restored to the French Government, intact, after the war. During the captivity, Bazaine frequently wrote to Jarras, asking him for the papers or begging him to state their location; this Jarras wisely refused to do; his letters would have been opened and the documents for ever lost to France, besides the safety of their custodians would have been imperilled.

Jarras lays no claim to have written the history of the siege, but only to have faithfully recorded the particulars which he personally saw of the history of the Army of the Rhine, from its formation to its fall. The souvenirs bear the impress of truth, and, from the very fact of his not mentioning things with which from hearsay he must have been fully informed, an accrued value is put on the narrations of those matters which he saw and recorded.

It is somewhat startling to find that the "Souvenirs" make no mention of the serious weakening in the German forces surrounding Metz during the 27th and 28th of August, when two complete Army Corps moved north-west from the beleaguering line to support at need the attack on MacMahon's Army.

The deductions that follow from a study of these remarkable "Souvenirs" are varied, although perhaps they are more valuable than new.

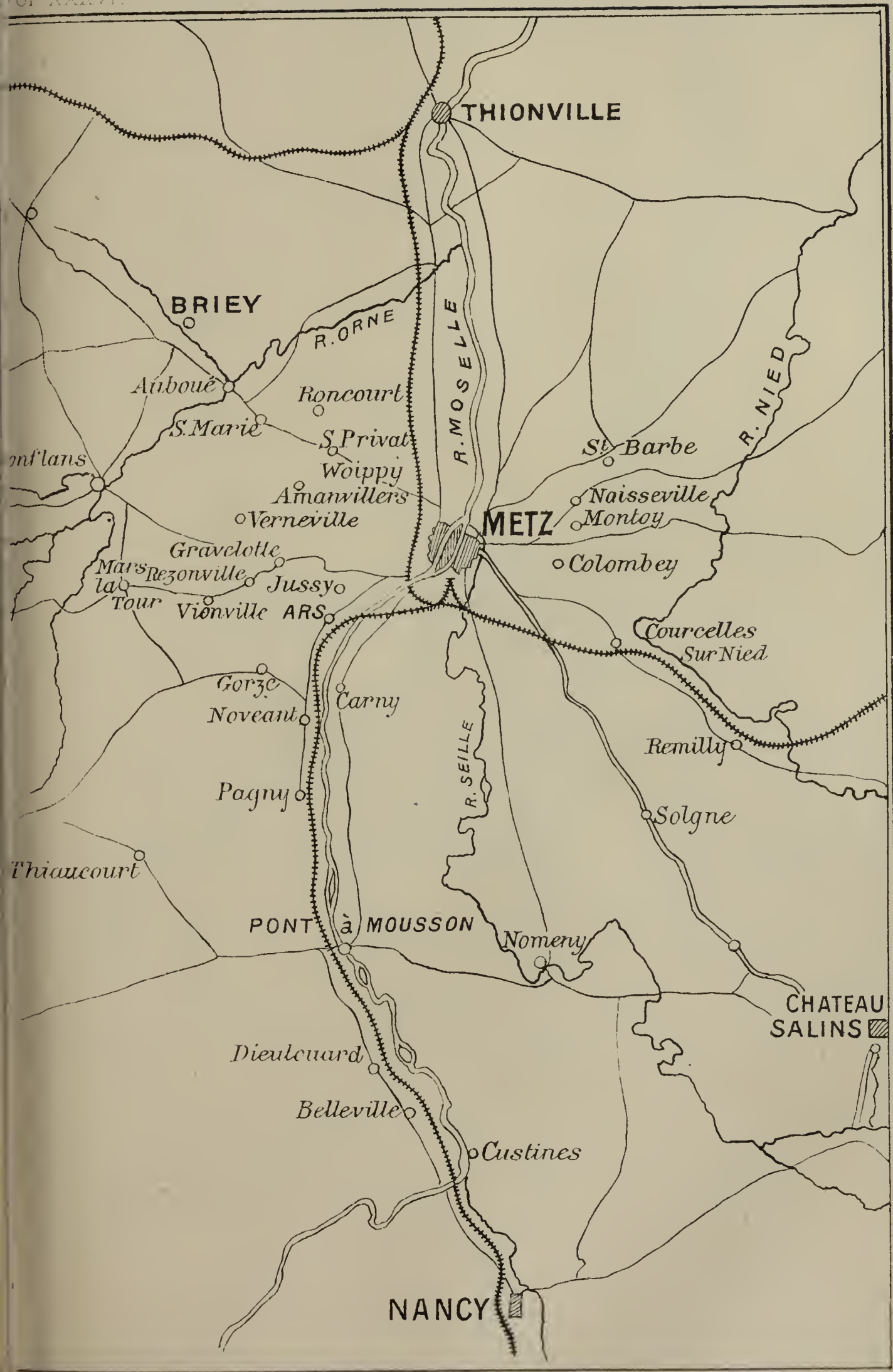
All organization for war against a considerable enemy must necessarily be made in peace, if full justice is to be done to the fighting material of a nation.

Foreign assistance in a selfish quarrel is not to be reckoned on, even when dangled before longing eyes by authorized personages.

Haphazard appointments to command or to Staff on the outbreak of war are ill-advised, and tend to disaster: Officers and men accustomed to united work have increased efficiency.

The best of troops, if placed in false positions, are not to be depended upon for resisting high pressure; and, above all, homogeneous working between the different portions of a country's forces must be fostered in peace to ensure their just advantages in war.

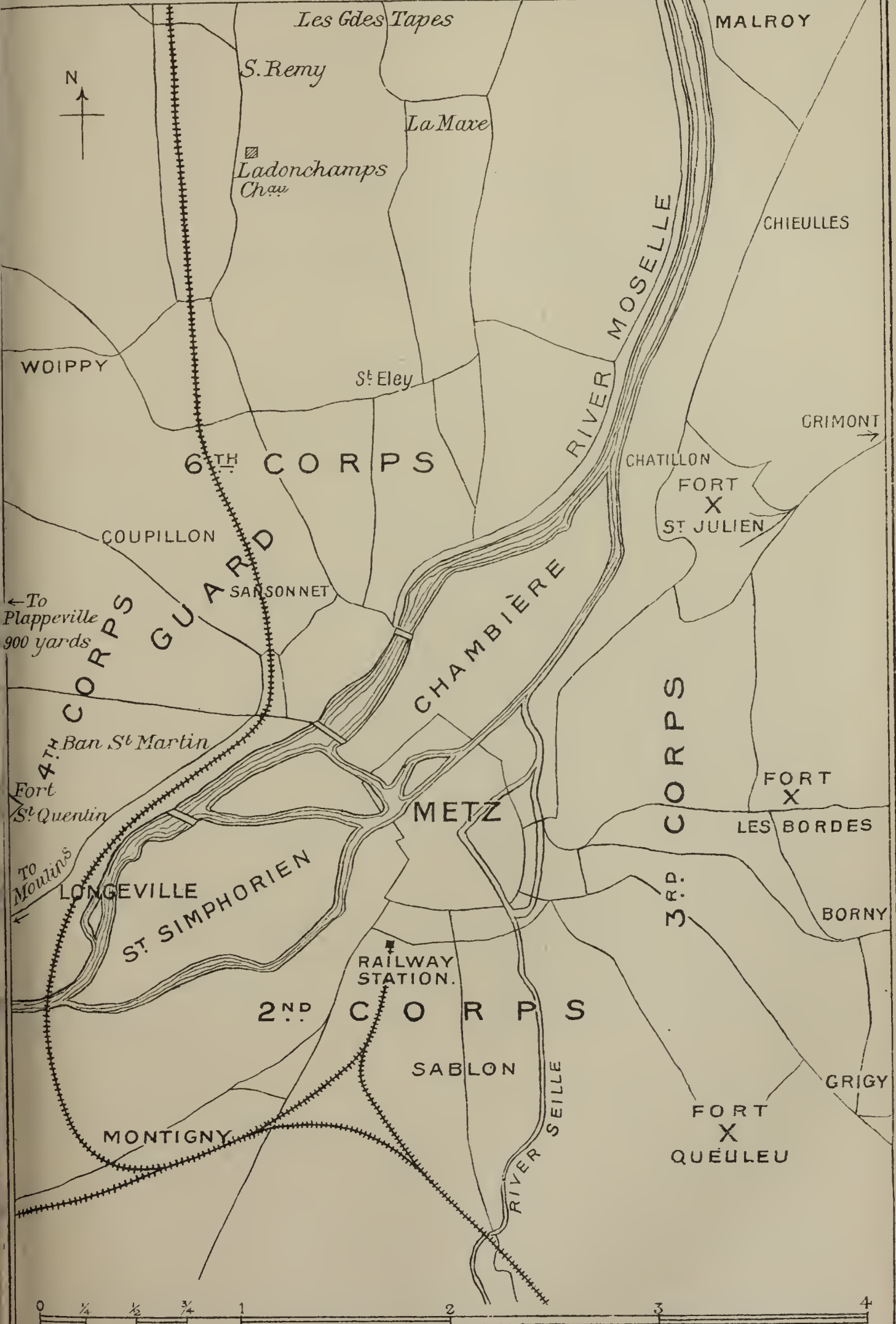
Marshal Bazaine was a soured Corps Commander, and neither gave confidence to, nor gained confidence from, his personal Staff; and the man himself was inappreciative of his own and his Army's necessities. Confidence well bestowed is seed sown on fruitful ground; the reverse, in his case, brought forth fruit of the class to be expected from his surroundings; whether the quality of fool or rogue predominated in his character is a study for casuists; but, till the war of 1870-71 had run its course, the human race had no knowledge of the disasters, amounting to temporary ruin, that a few weeks of active mishandling of gigantic numerical forces, following years of faulty organization, could entail on a leading military nation among European States. France has learned her lesson, and it is to be hoped that other peoples may take due warning from her dearly-bought experience.



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Sketch Map of positions of French Army in Metz after August 26th 1875



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THE RUSSIAN NAVY.

(Translated by permission from the "Internationale Revue ueber die
Gesamten Armeen und Flotten," by Captain H. W. L. HOLMAN,
R.M.L.I.)

I.

SINCE the dissolution of the Alliance of the Three Emperors, since the time when Bismarck gave Russian diplomacy to understand that he had drawn closer to his more natural and more trustworthy allies, since Italy too has joined the league of peace, finally, since the Central European Powers and with them England more or less, have taken up an unmistakable attitude regarding the Bulgarian confusion, Russia's Army has experienced vast reorganizations and has made tremendous progress.

The great fault of the Russian Army lay, as the last two Turkish wars proved, in the cumbrous mobilization plans, which did not at all meet the requirements of modern warfare. Even when we read the history of the Crimean War, when the Russian corps after long, fatiguing and killing marches, appeared decimated on the theatre of war, when we estimate the weak forces they hurled against the Turks at the last crossing of the Danube and Balkans, when we remember the fruitless exertions of the brave Skobelev before Plevna, when we place before our eyes the mission to the Roumanians, which called on them for the sake of the Cross to hurry up to their assistance, we must finally arrive at the conclusion, either, that a few years ago Russia saw no probability for a long time of any conflict except with the Turks, against whom matters could certainly be taken more easily, or else, that she was very much behindhand in the art of war and did not know what a plan of mobilization really meant. But affairs have vastly changed in the last few years. From the furthest corners of the mighty and extensive Empire of the Czar, soldiers have hastened like swarms of bees, to the West.

The German and the Austro-Hungarian frontiers are lined with a huge multitude of warriors of all arms; thousands of guns, a forest of bayonets and hundreds of thousands of horses stand ready to pour with Asiatic savageness into civilized countries. The greatest military force is concentrated on the western frontier of the Empire, already half mobilized, at any rate perfectly capable of being mobilized in a very short space of time. With the reorganization of the plan of mobilization and the redistribution of whole armies, all sorts of other reforms went hand in hand, in which the Navy was naturally not left out of consideration. While we leave it to others to increase the many studies of the latest times on the Russian Army by further

contributions—for a future enemy can never be studied too much—we will turn our particular attention to those reforms and innovations which affect the Russian Navy.

II.

We need not take the map in our hands, for every one has the Russian frontier so far in his head to satisfy ourselves that Russia's extent of coast line is enormous, and that for the defence of so vast a littoral a large fleet is necessary. It also happens, unpleasantly for Russia, that the coasts referred to are not contiguous, and are widely separated from each other. Indeed on the eastern side of Europe the Russian shores form the boundary of the whole Continent. Eastward from Varanger Fiord the whole northern stretch of Europe and Asia belongs to the Russians. Separated from this is the Baltic coast from Tornea to Polangen. Finally, in the south, the Black Sea from the Danube to beyond Batoum is Russian. To these must be added the possessions on the north-east coast of Asia, and the large lakes and rivers which must also be provided with men-of-war. Certainly a portion of these coasts defend themselves, for an attack on the shores of the Arctic Ocean is not to be imagined. But even if we leave the inhospitable northern coast out of consideration there is still a great deal left. Russia has, therefore, for a long time endeavoured to have a good Navy at her disposal, and possessed one indeed even before the perils of the last war. In the year 1880 the Russian Baltic Fleet numbered 10 sea-going ironclads and 13 coast defence vessels (Monitors) of 1,500 to 2,000 tons, which could have rendered excellent services in northern seas. Added to these were about a dozen very elegant cruisers, which were generally cruising abroad, and which were greatly admired by connoisseurs on account of their beautiful build. A number of gunboats, yachts, training ships, &c., completed the floating matériel.

In the Black Sea, in accordance with the Treaties, Russia possessed no Fleet, except small vessels and the Popoffkas, which, if we are not mistaken, were built between the years 1872 and 1876. She numbered at that time little more than half-a-dozen unarmoured ships of about 1,200 tons, and 10 or 12 of 500 to 700 tons.

The flotillas for Siberia, the Caspian Sea, Lake Aral, and the Oxus consisted of smaller ships.

The want of a suitable naval force in the Black Sea must have been painfully and bitterly felt in Russia, especially at the time of the last Turkish War, when an ironclad squadron would not have failed to operate against Constantinople. The will of Peter the Great, and the final aim of Russian politics, always points in the direction of Aja Sophia; if the way thither seemingly leads—taking the present state of affairs into consideration—through Berlin or Vienna, yet the possibility of a final understanding, of an agreement with the Central European Powers, must not be regarded as out of the question; and Turkey will for a long time remain for Russia the neighbour to be ultimately fought. But to operate with success

against Turkey and to lighten the heavy task of the Army, Russia, would require a strong fleet, composed of first-class battle-ships, to act in the Black Sea. The Russian Government and diplomacy, therefore, troubled mighty little about the winged words of the foreign press which drivelled about broken treaties, &c., and, knowing that on this account none of the States that were parties to the treaty would draw the sword, she one fine day renounced the stipulations of the Peace of Paris and laid down the keels of the armoured cruisers "Sinope" and "Cesme" in the docks of the Russian Steamship and Commercial Company, at Sebastopol. On the 5th October the keel of the armour-clad turret ship "Catherine II" was laid down at Nikolajeff, with a great display of pomp, and accompanied by stirring speeches which found a tremendous echo at Moscow and St. Petersburg. This event took place for the other two ships named a couple of days after. The fact that the Admiral of the Fleet, the Grand Duke Alexis, went down to the south for this ceremony is of marked significance.

We shall see later on, relative to the number of ships to be built for the Black Sea Fleet, what objects Russia is pursuing, but we must just mention here that, according to the Fleet programme of 1882, the huge ironclads to be employed there will be the most powerful of the whole Russian Navy. The "Catharine II," "Sinope," and "Cesme," which were launched in 1886-87, when completely fitted out, showed a displacement of 10,180 tons. An armoured belt of 457 mm. (18-in.) stretches the whole length of the ship and forms, with the 76-mm. (3-in.) strong, armoured deck, a particularly effective protection. Six 30½-cm. (12-in.) Krupp guns are in a citadel, on disappearing carriages, so that they are only visible in the firing position. Seven 15-cm. (about 6-in.) guns, two of which are bow and two stern guns, together with ten machine-guns, complete the armament.

Their twin screws, with engines of the three-cylinder type of 9,000 indicated horse-power, give a speed of 15 knots. Finally, the coal supply amounts to 872 tons, and admits of their steaming four days at an average speed of 14 knots.

The re-formation of the Black Sea Fleet necessitated the restoration of Sebastopol to the rank of a first class naval port. For a long time it was doubtful whether Sebastopol should be finally fixed on, but in the end this port gained the day. A commencement was made with the building of a dry dock—strictly speaking two dry docks; the laying of the foundation stone followed, likewise in the presence of the Grand Duke Alexis, on 6th October, 1884 (the works were commenced in 1882). They are in the same place (Korabelnaja Bay) as the granite dry docks destroyed after the taking of Sebastopol, in 1855. These docks are respectively 182·5 m. (about 600 ft.) and 140 m. (about 459 ft.) long at the water line and 37½ m. (about 122½ ft.) broad, with an average depth of 8·4 m. (about 27½ ft.). Each dock is emptied within 8½ hours, by means of two centrifugal pumps. The cost was declared to be in round numbers 3 million roubles (about 300,000*l.*). As a matter of course, the old fortifications have been restored and arranged to meet the latest requirements

of the science of war. Last year two new forts were built, one on the right bank of the Tchernaja and the other on the hill where the English constructed Fort Victoria during the siege of 1854. These two forts command the whole of the open country round Sebastopol, and would render a second edition of the events that took place during the Crimea considerably more difficult and almost impossible. It is hardly necessary to mention that the entrances to the harbour are barred and defended by rows of mines and torpedo stations.

Of course the great attention that was paid to the Black Sea necessitated a large sacrifice of money. In an autocratic State, where it is not necessary to wrangle about every penny with members and representatives, it is an easy matter to procure money, as long as the State enjoys credit; still, taking into consideration the low strategic value of Archangel, and after searching investigations had been carried out by the War Office, Admiralty, and the General Staff, the Russian Government decided, in 1887, to leave this far northern arsenal entirely out of the question, and to let the development of Sebastopol benefit by the expenditure saved thereby. In a word, Sebastopol has become the pet of the Russian War Administration.

If we look at the map more closely and collect from the geographical and political writings of the very latest years those notices that relate to further completed or projected works in the Black Sea and in the neighbouring eastern countries and those beyond them, a new horizon opens up before our eyes, and we perceive that the Russian preference for the Black Sea springs from far deeper motives. It is not alone the contingencies of a war with Turkey or with the Central Powers that is rousing Russia to such feverish activity, it is not with the view of hemming the Crescent in on all sides, but the strategical and commercial importance of the Black Sea, which increases from day to day. We must not forget that the Balkan countries had only a momentary importance for Russia, that she has aims in Asia also; that there are there, without thinking of further conquests, vast territories which, better cultivated and brought into closer connection with the civilized world, must develop extraordinary productiveness.

Now if we examine what the works are that we touched on above, and which are partly projected, partly finished, or in course of execution, we must mention, as the least of them, the cutting of the isthmus of Perikop, which joins the Crimea to the mainland of Russia. According to the plan before us, the canal (the cutting of it began in 1888) is to pass through Perikop, Goutschar, Sivash, to Genitschesk, and will be 118 km. (about 73 miles) long; its breadth at the bottom will amount to 20 m. (about 65½ ft.) and its depth to about 3½ to 4 m. (about 10 to 13 ft.). The canal is therefore calculated to take coasting vessels, torpedo-boats, and coast defence vessels, and, according to the preliminary estimates, is to cost 85 million roubles (about 8,500,000*l.*), and to be opened for traffic in 1893.

If we consider that by means of it the mouths of the Danube, Bug, and Dnieper are brought 140 knots nearer to the ports of Berdjansk, Mariapol, Taganrog, and the mouth of the Don, and that it will lead to

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Chelmsford, The Rt. Hon. Lord, General, G.C.B.

Fanshawe, Sir Edward G., Admiral, G.C.B.
Boys, Henry, Admiral.
Erskine, George, General.
Simmons, Sir J. Lintorn A., Field-Marshal, G.C.B.,
G.C.M.G.
Baylis, T. H., Lieut.-Colonel late 18th Middlesex
Rifle Vols., Q.C.

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¹ The names of the Vice-Presidents are given according to seniority of election.

* Nominated by the War Office.

N.B.—The Figures 1, 2, 3 indicate the year of Service on the Council.

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a quicker and shorter sea passage between the terminus at Odessa and the railways running from the Sea of Azov, we can understand that the commercial advantage of the canal will be as great as its strategical value. From the strategical standpoint not only the 114 knots shorter voyage must be taken into account, but also the greater protection the torpedo-boats and coast defence vessels will find than by going round and doubling the Crimea. They will more easily avoid danger from hostile ships and also the bad weather that generally manages to rage in the Black Sea.

Another important step of the Russian Government was the founding of Novorossisk. Novorossisk lies at the end of that beautiful deep bay, which was better known by the proximity of Soudjoukkalé, and which is separated from the sea by a flat spit. The northern spurs of the Caucasus end there. The bay is almost 10 km. long and 3 wide, with an average depth of 12 to 13 m. (about 39 to 43 ft.), and $4\frac{1}{2}$ to 8 m. (about 15 to 26 ft.) by the piers. The construction of the harbour has cost the Russians about 40,000,000 marks (2,000,000*l.*). A single line of railway was at once laid to Rostow, which branches off at Tischoretzkaja to Wladikavkas. The latter part of the railway runs along the northern slopes of the Caucasus, through exceptionally rich districts, a truly "Promised Land," that would only require the busy hand of man to produce enormous quantities of grain. As, furthermore, the project for tunnelling the Caucasus and the connection of Wladikavkas with Tiflis, hitherto looked upon as to a certain extent impossible, approaches realization, we can judge of the strategical importance and the commercial future of Novorossisk. In the "Mittheilungen aus dem Gebiete des Seewesens" we read the following interesting remarks on it:—

"To the immediate north of the Caucasus extend wide stretches of fertile country, towards which hundreds of peasants coming from the north wend their way each year.¹ Twenty years ago the whole district of Stavropol was inhabited by Cossacks, who by the pressure of the peace-loving peasants, have now, also, for the most part lost their warlike and even predatory spirit. In consequence of this movement of the population towards the Caucasus, Russia, it is true, loses her Cossacks, but, on the other hand, she gains a pushing peasant population which gravitates with its products towards the Black Sea. Formerly the Stavropol district only yielded horses during peace, and wild, hungry Cossacks in war time."

But, Novorossisk is also of great importance for the exportation of petroleum as well as for corn. The districts which harbour the petroleum treasures of the Caucasus are Baku, on the Caspian, and Taman, on the Black Sea. The former region sends its products by Batoum. The 600 miles of railway journey is, however, no light matter for the cargo and is expensive. By the diversion of this branch of commerce to Novorossisk, matters assume a more favourable aspect; the region of the springs is only 60 miles distant from the port and is connected with it by a line of pipes.

¹ From another periodical we learn that many German colonists also have settled in the Tischoretzkaja-Wladikavkas district.

Besides the commercial advantage that arises therefrom, the Russian Fleet obtains a cheap fuel, at least for a portion of its ships; a matter that must not be under-estimated. In the event of an outbreak of hostilities, the Russian Black Sea Fleet would probably be thrown back on the coal supplies that had been stored up before the war; this was the case in the last Russo-Turkish war, and the supply ran so short towards the end of it that several steamers could not put to sea on account of the scarcity of fuel. When the burning of petroleum is introduced, Russia will be quite independent in this respect and, covered by the battery of Soudjoukkalé, the Russian men-of-war will be able to pump their fuel on board from the reservoirs of Novorossisk and keep at sea with the supply twice as long as with coal. With its resources in corn and oil, Novorossisk has all the properties of a naval port that would play an important part in a war, as it doubtless seems called upon to do.

There is, however, another point of view from which the foundation of Novorossisk seems important, and that is from strategic railway point of view. The laying down of the line from Wladikavkas to Petrowsk, on the Caspian Sea, must be looked on as impending, and then Russia will have two parallel lines at disposal, so that in case of war she will be able to throw her resources from the Caspian Sea and the Volga to the Black Sea and *vice versa*. As if such works and projects were not enough, we read in the papers a couple of years ago, that the Russian Government had granted to a Franco-Russian company in Odessa a concession for the construction of a canal joining the Black Sea with the Caspian, and which, with a length of 85 km. (53 miles), was to cost 40,000,000 roubles (about 4,000,000*l.*).

Everything we have quoted so far gives the Russian Empire an extraordinary power of resistance in the Black Sea, and it cannot be denied that the Black Sea Fleet is receiving a support that makes it powerful. But it would be foolish to fix our thoughts only on this one point and to look upon the gigantic railway and other works simply as a means of support to the Fleet. Still more foolish would it be to believe that all these preparations are taking place in view of an approaching war with the Central Powers.

If we hold the map before our eyes for a short time longer, we must rather arrive at other conclusions. The present position of Russia with regard to the Central Powers is somewhat strained, it is true, but the possibility of a final agreement, as we have already said, is not entirely out of the question. What are the Balkan countries, which, if some of them do for the moment partly rave for Russia, would not long bear the Russian yoke—what are they, we say, in comparison to the Asiatic territories where Russia is called on to play a part? Servia and Montenegro are the only fanatical people who look towards St. Petersburg, but the civilization of the Servians is too advanced to really believe that present circumstances will last long. And the handful of Crnogorzen need not trouble anyone. Like the Bulgarians, the Servians cannot possibly wish to willingly sacrifice their freedom and independence; sooner or later this coquetting will come to an end, and in one way or another peace

and order will be restored. It is, also, to be hoped that the horrors of Siberia will cease, and that Russia will undertake a more civilizing mission, as, indeed, she has carried out, it cannot be denied, for some decades past in Asia, but not with the energy that would have been possible with otherwise normal circumstances. The construction of the Siberian railway is an important civilizing step, and if we look further towards the south, the other line along which the iron horse races strikes our eye, and which, starting from Usan-Ada, on the Caspian Sea, leads through Merv, Bokhara, and Samarkand to Tashkend (this last branch is still under construction). At three points on this railway, namely, at Duschak, Merv, and Tocharaschin, branch lines are planned towards the south. The main line itself is, in time, to be continued on one side to Orenburg and on the other to the Altai and towards the Siberian line. There is a further idea of joining the Amu-Daria with the Caspian. A couple of years ago, A. J. Gluchowski pointed out in the "Company for the Promotion of Russian Commerce and Industry," in St. Petersburg, that the execution of such a junction would prove by no means difficult. The Amu-Daria could be led into the Kun-Darja; it would fill the basin of Ssarakamysh and go from there through the Usloj to the sea, or, by going round the basin, a canal about 75 versts long would have to be made which would likewise fall into the Usloj. The former plan would cost 15 millions, the second 27 millions. Russia certainly will not let this idea fall, as here, also, it is a question of changing boundless and fruitful stretches of country, now lying bare, into cultivated land.

They are therefore mighty roads from Siberia, China, Persia, Afghanistan, Northern India, &c., which are meant to have their termini on the Black Sea; and Russia naturally cannot then leave such a coast unprotected and undefended. She wants, therefore, a strong, powerful fleet to protect the trade there and to promote the development of her merchant navy. May God grant that the newly arisen or reconstructed Black Sea Fleet may only have to fulfil such peaceful and civilizing missions! Russia and the whole world will reap nothing but blessings from it, and the Russian people will be more thankful to their Czar than if he leads them into a war that can in no way bring any good and will throw millions of widows and orphans into misfortune and misery.

III.

In the Black Sea there was naturally more to do than in the Baltic. The Baltic Fleet numbered a whole lot of vessels, and it was only a question of adapting them to the demands of the science of modern war. Accordingly new ironclads have been built, and a large number of torpedo-boats bought.

Of course the completion and reform of the fleet follow a fixed plan, namely, the building programme sanctioned by the Czar in 1882.

According to the same, the Russian Navy is divided into four fleets, namely:—

1. The Baltic Fleet.
2. The Black Sea Fleet.
3. The White Sea Squadron (Siberian Flotilla).
4. The Pacific Squadron.

The building programme is to be completed in twenty years from 1883, that is, in 1903, when the different divisions will consist of the following ships:—

Baltic Fleet:—

- 11 First-class ironclads of 10,000 tons displacement.
- 4 Second-class ,, ,, 7,000 ,, ,,
- 11 Gunboats.
- 10 Cruisers ,, 3,800 ,, ,,
- 6 Transports and a corresponding number of torpedo-boats.

Black Sea Fleet:—

- 8 First-class ironclads of 10,000 tons displacement.
- 6 Dispatch cruisers.
- Torpedo and gunboats.

The total cost of building these is reckoned, in round numbers, at 900,000,000 francs (36,000,000*l.*) ; so that the yearly quota amounts to 45 millions, of which 20 millions fall to the ordinary and 25 to the extraordinary expenditure.

Of the new ships for the Baltic Fleet, 7 ironclads are finished and 3 others in course of construction. The displacement of the ships built does not exceed 9,000 tons, which, perhaps, seems more suited to circumstances in the Baltic.

The new Fleet programme and the technical changes in the matériel of the Fleet, and, finally, the introduction of the torpedo, rendered a reorganization of the personnel and administrative authorities necessary.

As far back as the year 1883, the Director of the Ministry of Marine received the full power of a Minister of Marine. A special Admiralty Council acts as the supreme naval authority, and in which the Director of the Ministry of Marine has a seat and voice as President representative.

In the highest naval department were united those matters which regard the tactical direction of the Fleet and its employment in case of war and those dispositions which refer to the fitting out and the personnel of the Fleet.

A Marine Scientific Committee follows the progress of naval science and sees to the introduction of new inventions.

Finally, a Shipbuilding Commission studies the plans of ships and occupies itself with the completion and equipment of ships, as well as with arming them. It lays plans before the Minister of Marine, makes reports and submits tenders which refer to the building of new ships. The work of the Shipbuilding Commission is examined beforehand, however, by the Marine Technical Committee.

In the year 1885 followed a reorganization of the personnel of the

Fleet. Up to that time there existed the "Pilotage Corps" and the "Marine Artillery Corps," which were now broken up. Furthermore, a reduction of the active list of Officers, which consisted of 100 Admirals and 2,235 Officers, was considered desirable. After the reorganization of 1885 this number was reduced to 1,563. Russia now numbered an Admiral of the Fleet, a few Admirals, 20 Vice-Admirals, 35 Rear-Admirals, 86 Captains, 194 Commanders, and 529 Lieutenants and Sub-Lieutenants.

With regard to promotion, it was laid down that it should take place by seniority or out of turn.

The following are the rules as to the minimum sea time for promotion by seniority:—

Sub-Lieutenants and Lieutenants have to make up 4 years', Commanders 6, and Captains 8 years' sea time. Promotion out of turn in peace occurs among superior Officers (Commanders and Captains) only; they must have at least 5 years' service in their rank. In war-time other Officers can also be promoted out of turn, if they have, however, at least 3 years' service in their present rank.

Officers who have reached 55 years of age without being promoted to superior rank (Commander) are to be placed at once on the retired list. The same holds good for superior Officers at 58 years of age. Finally, Admirals are retired on the completion of their 63rd year.

Officers who have been in action and have served 28 years have the right to receive honorary rank, also those who have served for 33 years, and Commanders and Captains of 35 years' service, and Rear-Admirals with 40 years' service. Sub-Lieutenants, Lieutenants, and Commanders receive the retired pay of their rank, if they have served at least 1 year, and Captains if they have served at least 5 years in their rank before being pensioned.

Soon after the reorganization of the list of Officers followed the sanctioning of new and particular regulations for Constructors and Engineers.

The Russian Engineer Corps has five grades, as follows:—

1. Chief Constructors and Inspectors of Machinery, with the rank of Rear-Admiral, 3 for each branch.
2. 1st Class Constructors, 15 in number, and Fleet Engineers, 8 in number, with the relative rank of Captain.
3. 2nd Class Constructors and Engineers (23 and 28 respectively), with the relative rank of Commander.
4. 1st Class Assistants, with the relative rank of Lieutenant.
5. 2nd Class Assistants, with the relative rank of Sub-Lieutenant.

The Construction and Engineer Corps is recruited from the pupils of the construction and engine building section of the Naval Technical School, who are admitted into the corps as 2nd Class Assistants after examination. 2nd Class Assistants of the Engineer Corps may be embarked in steamers of the mercantile marine to learn engineer duties; they draw an addition of 720 roubles a year for this service.

The following rules have been laid down for promotion:—

2nd Class Assistants can only be promoted after 4 years' service; 1st Class Assistants after 8 years. The latter must during this time have done some construction work and satisfactorily accomplished some task set them by the Naval Technical Committee.

2nd Class Constructors must have served at least 5 years in that rank before they obtain promotion.

Assistant Engineers have to fulfil the same requirements as the Assistant Constructors, and in addition they must have been embarked for 1 year in foreign waters or 2 years in home waters. A 1st Class Assistant must have been embarked for 2 or 4 years respectively during his 8 years' service.

An Engineer can be made Fleet Engineer on completion of 5 years' service in his rank, if he has been embarked in a first class battle-ship for 1 year abroad or 2 years at home. The execution of construction designs or detailed plans of a ship's engines may make up for want of sea time. One-third of each branch of Engineers may be promoted out of turn.

The 1st and 2nd Class Constructors receive for the construction plans delivered by them a remuneration of 450 roubles yearly *pro* 1,000 tons displacement till a yearly maximum of 1,350 roubles is reached. The Engineers receive an addition of 300 roubles for satisfactory duty on board ship.

Constructors and Engineers may be granted leave with deduction of pay for the space of 3 years for service in the mercantile marine.

Constructors and Chief Constructors who remain more than 5 years in their rank receive a yearly increase of 2,500 roubles for good service. The same applies to Engineers of corresponding rank.

Engineers are at once retired when they reach the following ages without having complied with the regulations for promotion:—

2nd Class Assistants when they have been longer than 10 years in that rank. 1st Class Assistants at the age of 47, 2nd Class Constructors and Engineers at 55, 1st Class ditto at 58, Inspectors of Works at 65, Chief Constructors and Inspectors of Machinery at 68.

The claims for being granted honorary rank on transfer to the retired list are as follows:—

1st Class Assistants who have been in action and have 25 years' service; all Assistants with 33 years' service. In all other ranks 33 years' service is required; for Inspectors of Machinery, however, 40 years' service.

For recruiting the personnel of the Fleet, Russia possesses the splendid Naval College at St. Petersburg (Wassili Ostrowo). Its teaching and superintending staff numbers 1 Rear-Admiral, 1 Director of Studies, 1 Director of Military Training, 5 Class Officers, 12 Officers, and 130 civil officials. The period of instruction lasts four years, and before the pupils are accepted an entrance examination has to take place. Besides professional subjects, English and French are taught at the College. There is furthermore a Technical Military College in Cronstadt which is given up to the Engineer branch. The higher Academy in St. Petersburg is only meant for

Officers and Engineers. All these institutions have already been discussed in this periodical, and we may therefore content ourselves with this slight reference to them.

For special courses there are one or more gunnery ships, and a torpedo course for Officers at Cronstadt. The period of instruction at the latter amounts to eighteen months. For petty officers there are torpedo schools at Odessa, St. Petersburg, and at the present time, one at Sebastopol. The Naval School of Musketry founded at Oranienbaum forms a speciality of the Russian Navy. At it Officers, as well as petty officers, are exercised and instructed in shooting with small arms, in gymnastics, in fencing, in small-arm drill, and duties under arms. Pupils who have passed find employment as instructors. The Commandant is a superior Officer, who is directly under the Chief of the Admiral's Staff; two Officers act as Instructors. The establishment of pupils is made up of 12 Officers and 121 petty officers of the Baltic and 2 Officers and 20 petty officers of the Black Sea Fleet. In order to carry out drills for landing parties as well, this establishment has six rowing boats, two steam launches, and a corresponding number of land service and quick-firing guns attached to it. There is a remarkable order, according to which drill days in the boats count as regulation sea time for the Officers. Ammunition for practice is allowed as follows: 200 rounds of Berdan ball cartridge, 100 rounds of blank cartridge, 200 revolver cartridges, and 300 rounds of needle-gun cartridges for each pupil.

With the large effective list of the Russian Navy, the Admiralty is obliged to retain a large number of ships in commission, so as to keep all the Officers in constant practice. Now, as navigation is impossible in the Baltic during the winter months, the summer is made use of all the more. The same may be said of the Black Sea, which is not indeed frozen over in winter, but is frequently visited by fearful storms. For the great summer manœuvres, which take place yearly in Russia also, the Ministry fits out rather a large number of ships. The different military periodicals bring out regular reports about them every year, and therefore we need not go closer into this subject. We must further observe that Russia keeps a squadron permanently in commission in the Mediterranean, and another in Eastern Asiatic waters, also that Russian particular service ships are to be found in all parts of the world. As regards cleanliness, order, discipline, and seamanlike capability, every one who has had the opportunity of visiting and observing Russian men-of-war must admit that Russia is second to no navy in the world in these respects, and could even give points to several big maritime nations. In sail drill, as well as in exercising at clearing for action and landing parties, in short, in all nautical and military exercises, the Russian naval Officers and seamen earn for themselves the respect of all sailors. We need hardly mention that just lately some of the best tactical studies and theories have been published by Russian Admirals.

In order to stimulate the scientific education of the naval personnel, the Russian Ministry of Marine publishes from time to time a few

Prize Essays, the best of which are rewarded with large sums of from one to two thousand roubles.

We will finally relate the dispositions which the Admiral of the Fleet, the Grand Duke Alexis, has taken with regard to the readiness for active service of the torpedo-boats, and which are in force at the present time.

The torpedo-boats have always got their complete personnel told off to them. They, as well as their crews, belong to the different squadrons of the Fleet united at Cronstadt, in the proportion of fifteen boats per squadron at the most.

The crews of each fifteen torpedo-boats are formed into one company.

The command of each torpedo-boat is only given to senior Officers at times when manœuvres are to be carried out, preferably to Officers who have passed the torpedo course, or who belong to torpedo companies.

The superintendence of the torpedo-boats and their personnel is entrusted to a senior Officer, for choice a torpedo Officer.

The companies are commanded by senior Officers who have gone through the torpedo course; for winter drills two torpedo Officers and two technical workmen, who are familiar with the Whitehead torpedo, are added to them.

The preparation of instructions for the arrangement of details falls to the Chief of the General Staff of the Fleet.

With regard to ships' companies, it was laid down last year that the crews of ships and squadrons, with their Officers, should be kept together during the winter also, and on all occasions while disembarked. Accordingly, the seamen depôts have been reorganized, and number eighteen depôt companies in the Baltic and six in the Black Sea. The same Officers who belong to the companies for embarkation act as company Officers and as Commandants of depôts. These dispositions have been taken, with regard to facilitating and hastening fitting out of ships and for the better maintenance of discipline. The advantage that thereby accrues to the Navy is palpable; however, in other navies, where the period of service is short, the same would not be practicable.

IV.

We saw above, that at the same time as the sanctioning of the new Fleet programme, a Siberian Flotilla and a Pacific Squadron were also mentioned. We were unable to gather accurate and extensive data about these two divisions of the Russian Fleet. The little we could learn is as follows:—

The Siberian Flotilla consists only of a few cruisers with, roughly, 1,000 tons displacement, of half a dozen gunboats, of several steamers for the rivers, and a corresponding number of torpedo-boats. That the flotilla is not neglected is proved by the fact that the professional papers pretty frequently announce the building of new ships for this division.

The Pacific Squadron only consists of cruisers (clippers) and smaller ships, such as gunboats, torpedo-vessels, &c. In Eastern Asiatic

waters, in China and Japan, Russia always maintains a squadron of from seven to nine ships, chiefly clippers and larger gunboats, which are under the command of a Rear- or Vice-Admiral. In former years this division belonged to the Baltic Fleet. This is probably no longer the case, and the squadron in question forms part of the Pacific Fleet.

Service papers of the past year announced that the headquarters of the ships in Siberia, namely, Vladivostok, was to be made into one of the strongest naval ports, and also that a dry dock was to be built there. The ships of the Volunteer Fleet have organized a regular service between this port and Odessa, and the passage is made seven times a year. As regards communication by land, we know that Vladivostok is to be the terminus of the Siberian railway which is in course of construction. As the Odessa-Vladivostok ships can only run in summer, connection with Russia in Europe is kept up during the winter by land *viâ* Tura, Irkutsk, Blagowietschensk, and Kabarowska. Two months and a half, or a continuous (night and day) journey of six weeks, is required to cover the distance to St. Petersburg.

The Fleet programme makes no mention of the Caspian Flotilla nor of those on Lake Aral and the Oxus. Indeed, the Aral and Oxus flotillas were declared to be broken up a few years ago, but, as far as we could gather, the matériel still exists and in case of need could easily be got ready for service. When, moreover, the Caspian is connected with the Black Sea by a canal, as planned, and the Amu-Daria has also been led into the Caspian, the Black Sea ships will easily be able to undertake a trip into the interior of Asia, and then the Black Sea will also be able to provide the inland seas of Asia with men-of-war. The Aral Sea Flotilla numbered at the time its dissolution was decreed four paddle-wheelers, a few steam launches, and several sailing ships. On the Oxus there were six paddle-wheelers, among them four that could be taken to pieces. The flotilla on the Caspian Sea numbers four gunboats of 200 to 400 tons displacement, a dozen paddle-ships, and several steamers for traffic, which in case of need could be used as men-of-war. Russia's intentions with regard to these waters are hard to divine, and the Russian Government will probably assume a waiting attitude before it carries out any decisive steps. The first thing is to strengthen her own position in the Black Sea; everything else is easier.

That Russia does not leave her inland waters out of consideration is proved by the recent building of a stern-wheeler to take to pieces, which was supplied by Yarrow and Co. According to the conditions of the contract, this steamer was to be adapted for transport over considerable distances by rail when taken to pieces, and on arrival at its destination to be put together without much trouble and waste of time. A further stipulation was, that the draught of the steamer was not to exceed 475 mm. (about $18\frac{3}{4}$ in.) with an armament weighing 7 tons and a sufficient coal supply on board for steaming twelve hours with full power. The speed was to amount to 10 knots.

Yarrow built the steamer in ten floating sections, whose dimen-

sions were so proportioned as to make each of them easily transportable on Continental railways.

We have been able to learn nothing as to the immediate destination of this vessel, nor whether, after the construction had fully answered the requirements, more of such ships capable of being taken to pieces were ordered. It is not impossible that the vessel supplied by Yarrow is now used as a model and that ships of this type are being built in Russian establishments.

Our thoughts again involuntarily recur to Russian preparations for a possible war with the Central Powers, when we read that Officers of the Russian Navy are on the Danube in order to learn pilotage duties there. We gather this news from German and Italian papers. We may at once connect this with the formation, a few years ago, of a Russian steamship company on the Lower Danube. It is not for the trade with the Danube countries that Gargarin has been working; Russia has much too extensive fields for commerce elsewhere, which demand her attention, and the object of her penetration on the Danube is palpable. But it is now still clearer by the appointment of Russian Officers to learn pilotage duties.

The so-called "Volunteer Fleet" will constitute a factor that must not be underrated in Russia's next war with any other Power. The ships of the Volunteer Fleet, about twelve in number, are, in peace-time, ordinary merchantmen, which can, however, in time of war, be easily armed and used for doing the work of cruisers. In 1885 this company undertook to cover 141,000 knots yearly, between the eastern Black Sea ports and the Russian ports in East Asia, in respect of a subsidy of 600,000 roubles per annum. The connection of this fleet with the State was formerly much too loose, in consequence of which, a new organization of it took place in 1886. According to the agreements of 1886, the Volunteer Fleet is under the Admiralty, but has its own management and capital. In peace it is bound to keep up regular commercial communication with East Asia. In its financial proceedings it is under the highest audit office.

The "Rivista Marittima" reports that at the present time a further reform of this fleet is in progress. The reforms will have reference to the composition of the Council of Administration and to the direction of business; the Navy is to have a stronger direct representation in the Council of Administration, as well as have the superintendence of it.

In war-time the Volunteer Fleet must be placed entirely at the disposal of the Admiralty. Its capital is to remain untouched during the war. Finally, the fleet receives subsidies from the State and mileage money as well.

The Volunteer Fleet, as we have already said, provides for the regular traffic between Odessa and Vladivostok. It runs, in addition, the tea trade and passenger traffic between China and the Black Sea. Among other things, its ships are also employed in peace as transports for troops, particularly for the transport of recruits and Reserve men between Odessa and Batoum.

In consideration of the direct and indirect benefit that the Navy draws from the mercantile marine and with regard to the general decay of the latter, the Russian Government, some five or six years ago, issued a law, by virtue of which private individuals are granted advances from the State for building ships; with the right of turning the debt over to the purchaser of the vessel. To avoid abuses, these favours are only accorded to professional shipbuilders who enjoy the best reputation. In giving publicity to this law, the "Mittheilungen aus dem Gebiete des Seewesens" made the following very true remark: "The reason for this subsidy on the part of the State must be sought for in the interest which the Government cherishes for the increase of ships which could be of use in war-time. Besides this, it is made easier for seamen to get ships, and the greater possibility of a livelihood is offered to retired naval Officers; finally, the number of sailors in the mercantile marine naturally increases with the number of ships, which again furthers recruiting for the Navy."

The Russian Navy costs the State over 40,000,000 roubles per annum, and the Budget has, indeed, increased during the last few years, as can be seen from the following summary:—

	Budget for the year in roubles.	
	1886.	1891.
1. Central direction and harbour administration	1,708,775	1,767,513
2. Rewards, allowances, retired pay	489,232	455,903
3. Naval educational establishments	515,098	538,082
4. Medicinal and sanitary concerns, hospitals	821,259	735,591
5. Pay of Officers on the active list, engineers, officials, wages of petty officers and men	3,775,764	3,359,520
6. Victualling	867,619	1,016,804
7. Clothing of crews	898,733	1,161,918
8. Sea service, training squadrons, particular service ships	4,915,577	5,237,074
9. Hydrographical service	419,159	453,388
10. Gunnery, torpedo, and mining departments, laying on electric light	3,105,168	3,944,245
11. Shipbuilding	15,685,940	17,525,573
12. Admiralty and dockyards (factories and workshops)	1,396,077	2,527,815
13. Rent, maintenance, building, and repairs of buildings	3,035,651	3,626,763
14. Particular appointments	400,000	450,000
15. Sveaborg Harbour . . . . .	..	50,272
16. Sundry and unforeseen expenses	1,371,705	903,463
Total	39,405,757	43,759,924 39,405,757
Increase of the Budget, 1886—1891 . . . .	..	4,354,167

To this must be added the extraordinary expenditure, which, if the fleet programme is carried out consistently, will alone require a further 20,000,000 roubles per annum for shipbuilding.

If we examine the *rôle* which Russia's Navy might play in case of war, it is certainly weaker as compared with the united fleets of the Triple Alliance, but still strong enough, however, to manage a powerful and effective defence. But if Russia gets many more years' time, her Navy will reach an undreamed-of strength. For, if present circumstances do not change, on completion of the ships planned, another fleet programme will be prepared. For the moment, Russia reckons on help from the French. But the alliance of the Republicans with the autocratic Czar is something unnatural, and rests on sophisms. In spite of the great momentary sympathy between the people of the two nations, a continuous liking for France cannot last in Russia, at least, if we cast a glance at the traditions of the country. In any case, Russia is striving to be self-dependent, and she is therefore continually making preparations and building, till the time will come when she will feel herself strong enough to shake off her unnatural ally. God grant that the Central Powers may meanwhile settle pending questions with the Muscovite Colossus at the board of green cloth, and that Russia's Fleet will only be called on to fulfil missions of civilization! And in this direction there is abundance of work for Russia.

A LONG-DISTANCE RIDE.

Translated from the "Invalide Russe" by Captain E. LAMBART, R.H.A.

THE strength of the detachment was :—1 General Officer, 1 Colonel, 14 Officers, 1 trumpeter, 80 Cossacks, and 3 followers, with 3 transport animals (without wagons). They were ordered to march 400 versts (about 250 miles) in five days.

In order to make the ride more interesting and instructive, the country selected was Finland, differing widely from the steppes, the home of the Cossacks. As the population understand little Russian, and in some places none at all, the conditions of the ride approached more nearly in this respect those of active service.

The object aimed at was—having placed the Cossack and his horse under the conditions of very arduous campaign life (absence of transport wagons and very long marches), in the face of continual natural obstacles, woods and mountains in place of boundless steppes—to work out rules for the guidance of detachments and to test the endurance of horses and readiness of resource of the men; also by observing the Officers' chargers, to see how far the imported horse is suited for long marches. Five days beforehand, a non-commissioned officer and 4 Cossacks were sent out to reconnoitre the road. This non-commissioned officer marched 23 miles, to the village of Baylostrov, halted there for the night, and made enquiries from the inhabitants as to the road, and returned the next day by the sea-coast road through Sestroraytz. He reported as follows : "The eastern road (the high road to Viborg) is paved with stone to the frontier, 35 miles from the capital, and the coast or western road is sandy throughout. The eastern road is completely free from the snow, but the western is covered with melting snow, especially in the woods and hollows. There are few villages, but at all the post-stations there are 'serais' capable of holding the whole detachment."

The day before starting, the Officers were furnished with routes notifying the halting places, and tables of phrases to be used in communicating with the inhabitants. The horses were in ordinary condition, not having been put into any training for the march.

The first march was to the village of Kivineb, $43\frac{1}{2}$ miles from the barracks.

The detachment marched at 11 A.M., preceded by patrols with orders to avoid all possible obstacles. The Officers rode apart from the men 300 yards ahead, who marched by threes in full marching order under a Squadron Commander. The horses carried two days' rations for man and horse. The pace was alternate walk and trot of

a verst,¹ with a halt after every 8 or 10 miles, to adjust girths and loads. After each halt the men walked for a verst leading their horses.

A halt was made half way for an hour and a half, when the kits were removed, the horses fed with damped oats, and watered before starting again. Two versts from the end of the march, the men dismounted, loosened the girths, and led their horses in. On arrival, the horses were supplied with abundant hay and straw. The average pace of this march was 4 to 5 miles an hour, so that the halting place was reached about 9 P.M. At 11 P.M. the horses were watered and fed with oats, which they eat sparingly, preferring damped meadow hay.

On this march the thoroughbreds² showed more liveliness and go up to the last moment than the Cossack horses, but their soft stable-reared training showed itself at once when the weather changed during the night. As soon as a fine cold rain began to fall they became depressed and miserable, with staring coats, while the shaggy steppe ponies showed complete indifference.

The second day the march was resumed at 7 A.M., along an excellent road, in clear sunny weather, temperature 14° R. The 52 miles to Viborg were marched in ten hours, including a halt of two hours. On arrival, the horses were picketed in the manège of the artillery, and the men accommodated in barracks. The manège was still wet from the winter snow and rain, and, in spite of ample bedding, 75 per cent. of the horses did not lie down. Five troop horses could go no further, and were left at Viborg. The remainder were stale and weary on the next day's march to the waterfall at Imatra, 39½ miles, which were covered in nine and a-half hours. The slowness of this march was due, on the one hand, to the bad night's rest of the previous night, and, on the other, to the severe climb over the high Finland hills. On examining the horses it was found that the sandy and hilly road had worn the shoes of the forefeet very severely, in some cases the horn as well. Several horses had to be re-shod. Small brushes were noticed on the coronets, due to the fine sand sticking to the wet feet and rubbing away the skin, and in some cases these were beginning to fester. Many horses had brushed on the fetlock joints, which indicates the necessity for putting indiarubber brushing-rings on horses with close action behind when on active service, or, at any rate, of bandaging the hind fetlocks.

The return march from Imatra began at 7 A.M., as it was intended to pass through Viborg to Khoomel, 54 miles. The weather was unfavourable, fine cold rain changing to snow on the hills. The pace was a sharp trot, in order to arrive at the halting place by daylight. Viborg was reached at 5 P.M., when a delay of two hours was caused by the Officers of the garrison, who wished to entertain their comrades in arms. It was nearly 8 before Viborg was left behind. A thick fog covered everything. Dusk came on, and in the woods it was completely dark. It was necessary to turn from the path on to the

¹ Two-thirds of a mile.

² More correctly the stud-breds.—TRANS.

new coast road, but the inscriptions in Finnish on the mile-posts were unintelligible to the advanced Cossacks; the fixing of bits of paper written in pencil was a slow process, and useless in the dark, when even the posts themselves were hardly visible among the tree trunks, so orders were given that at every clearing huge arrows should be drawn on the sand to show the way. Even if it was too dark to see the road itself, it was not difficult, by the aid of a lantern, to find the mark, knowing beforehand where the patrols would have made it.

Thanks to this precaution, the detachment reached its halting place at 10.30 P.M. The remaining marches to Teryouk, $46\frac{1}{2}$ miles in ten hours, and St. Petersburg, 38 miles, were made without any difficulty, the horses and men being by this time in thoroughly hard condition.

The detachment was met in St. Petersburg by the General Commanding the division, and ranked past him in single file. The gay, lively appearance of the men and horses, though they were a little fine drawn, left nothing to be desired. This ride, 264 miles in five days without a day's halt, across mountains, in unfavourable weather, was a severe strain on the powers of man and horse. Owing, however, to the careful attention paid to girths, numnahs, and loads, the horses had no sore backs. If after the day's march any lumps appeared on the backs they were immediately dressed with salt water, a simple, well-known remedy, which caused the lumps to disappear by the morning.

The experiences of this ride seem to point to the advisability of doing the march as rapidly as possible, so as to give longer rest to the horses. Shortening the halts no doubt tires the men more, but gives them the advantage of daylight to make themselves and their horses comfortable for the night.

In dry, sunny weather, such as prevailed for the second and sixth marches, it is a good thing to give the horses, every 8 or 10 miles, a few mouthfuls of water, or at any rate to sponge out their nostrils with a damp rag.

The Laktin Bay was crossed in a ferry boat. At first the horses were placed head to head across the boat, but this unaccustomed position disturbed them much, and they would not stand quiet; so the last sections were placed by threes, heads to the front, and in this position they took no notice of their surroundings, and were quite quiet.

Fourteen Officers took part in the ride, of whom half rode Anglo-Don and Anglo-Arab horses from the studs, the others steppe horses, and it must be said, in justice to the former, that they showed more energy and life than the latter. The steppe horses at the end of a march, though they went on and increased their pace without much urging, yet were dull and heavy on the bit.

The greater daintiness in the matter of forage, &c., of the stud-bred horses must not be counted against them, as it is easily explained by their being stable-reared, and, moreover, accustomed to the greater care and better food which Officers' horses always receive.

THE DISTANCE RIDE FROM BERLIN TO VIENNA.

Translated from the "Militär Wochenblatt," by Lieut. C. H.
SCHLESINGER, Ind.S.C.

[The author of this article, Lieut.-General v. Rosenberg, is the Inspector of the 2nd Cavalry Inspection in Germany, and is a member of the Cavalry Commission. He is a cavalry leader, well known and highly thought of.—L. A. H.]

ON meeting to consider the above-mentioned distance ride, the general opinion of the German committee was that their Officers would be beaten by their Austrian comrades. Some were of opinion that the prizes should be separated, so as to avoid an international struggle. The suggestion, however, was overruled. Foreign competition was not to be shunned, as it would only thus be possible to arrive at a due recognition of one's own defects. This is about the same principle according to which we permit the best English steeplechase jockeys to ride. The principle has proved itself a very good one; the standard of efficiency of our gentlemen riders would certainly not have reached so high a degree had we avoided competing with the best, and only kept among ourselves.

The reason why we were beaten generally, especially as regards the number of riders that came home, may be approximately assumed as follows:—The Hungarian horses (of which a particularly large number arrived) are brought up much more hardened than our Prussian horses. The cause for this will chiefly be found in our horse dealing. Aged horses are not to be found at all among our breeders; what has not been purchased by the Remount Committee, or by Count Lehndorf, is, at the age of three years, virtually dragged out of the breeders' stables by the dealers. The better the horse's coat, feeding, in fact, generally speaking, his exterior appearance, the higher the price he fetches; and the breeders are hardly to be blamed if they, in breeding and rearing, take chiefly this point into consideration. They endeavour to obtain through well-shaped stallions and mares a result in exterior appearance as faultless as possible, and pamper the same in their stables. In this manner they most cheaply attain their object, for no dealer pays for what a horse can do. The horses of the Austrian Officers which arrived fit are nearly, without exception, all well-bred, light, and small animals, by no means perfect in shape. They would probably unfavourably compare in this respect, in the opinion

of an expert, with the horses ridden by the Germans. The reason that nevertheless these horses proved victorious is just that their more hardy bringing up since decades of years has hardened their sinews, muscles, stomach, &c., to a greater extent than is the case with us. This very evident circumstance might serve our horse breeders, especially those in Prussia, as a hint that if the reputation of the Prussian horse is to be retained in future, their rearing in this respect must be improved, *i.e.*, give more food, and harden the horses. Should this even now be attended to in future, many years must nevertheless elapse before the harm already done is repaired. Another reason for our defeat will be found in the weight of the riders. The Austrians have certainly selected with considerable intelligence those riders who combined a light weight with enduring powers and energy. That weight will tell on such a ride is surely true. Again, we may say that the Austrians, from the very commencement, were regardless of either horse or person. They made up their minds to ride as hard as they could, and allow their horses as little rest as possible; those which could not hold out remained simply on the road. With us the general opinion was that the ride could not well be accomplished under four days, and that the horse should on the first day above all be spared. Therefore our men rested so long the first night that they only on meeting their comrades made the discovery that they had debarred themselves from competing for the highest prizes. So they, as a rule, gave up the struggle, and simply just endeavoured to come in. A further, though hardly a weighty, reason for our defeat may be found in the state of the roads near Iglau, which, according to the Austrians, was very bad indeed. They found it very convenient to pass this part of the road at the commencement, and by day. I have heard opinions to the effect that with a wearied horse, or by night, this distance could not be passed otherwise than at a walk. It may in addition be taken as singularly unfortunate that just at the time that our riders arrived here an exceptionally thick fog is said to have set in.

For the usefulness of our horses for military purposes (and I confine myself here to these alone), horse dealing has generally its great disadvantages. In former days, when I joined, an Officer was praised if he saved his charger and was able to sell him after five years at a high price. He was praised for his knowledge of treatment, stable management, &c., especially by senior Officers. In my opinion the value of a charger depends on something quite different. An Officer, especially a junior, should in the first instance, under supervision, be able to well train his charger, and then get a good deal of work out of him, and be permitted to do so. He should not only be permitted but even encouraged to take part in long and heavy hunting, and especially on duty as orderly Officer, commander of a patrol, &c., should he be required to make good use of his charger. In this manner he will render useful immediate services, and above all acquire in the best way possible a practical knowledge of horsemanship. Whether an Officer, when the time is up, receives a high or a low price for the horse is far and away a very secondary consideration.

Equally disadvantageous as horse dealing acts in this respect, is its influence generally on the breeding. As I have already mentioned, the distance ride proved that almost without exception small, slight, and well-bred horses were used, which, from a dealer's point of view, would, as a rule, have fetched low prices. Had an Officer found anywhere a big heavy horse capable of considerable performance in this respect, he would undoubtedly, even if the horse had been an expensive one, used him for it. The horses which we saw arriving here were generally such which a breeder has no desire to rear, and that entirely because it does not pay him sufficiently well to do so.

The value of this distance ride with reference to our performances in war has been the subject of frequent and favourable discussion, and I have heard many an opinion which does not appear to me correct. In the first instance, I would like to point out that 360 miles will never be covered in war in so short a time. If during the last war patrols accomplished as much as 130 miles, it was only due to the rare occurrence that the enemy had no cavalry. Should he still possess any, such rides by patrols are hardly possible. I, however, am by no means opposed to such distance rides; they are always sure to be instructive, and strengthen sinew, muscle, and energy. The only objection is the expense, for, if we wish to be honest, we must admit that very many Officers have lost one if not two horses on this ride, and not only on the ride itself but also earlier, even before the entry, the expenses incurred in training were considerable. Moreover, these rides had better adopt a different character than simply that of a race. On more extended reconnaissances, it will always be requisite that an Officer in order to proceed quicker must still be able to ride his horse, not however to drag his horse along on foot, so that he really progresses slower than if he were without. On this occasion the method of dragging the horse past the winning-post was quite justified by the desire of obtaining a prize. Many opinions have expressed themselves to the effect that in order to save the horses the distance should be cut down to a half or a third. Now I believe that, as long as the ride retains its present character, there will be no difference in the loss of horses. For shorter distances would after all be covered at such a pace that, if anything, more horses would succumb. I might even say that in a race of 850 miles less horses would be injured than in a race of 85 miles length.

Although I have been much interested in this ride. I must confess that it is hardly the best preparation for our military purposes, which should be looked for in another direction.

The greatest efforts will invariably be demanded on the occasion of a reconnaissance, or in the case of an orderly. An Officer on reconnaissance will, however, rarely be able to make much use of a high road during the principal stages of his duty. If he proceeds along them, he is sure to meet with the enemy, but he will be fired on at a distance from 800 to 1,000 yards, and only know that the enemy is there and no more. If he wishes to send in more detailed

information, he will have to ride across country so as to get at the enemy's flank, for he will only be able to observe anything from that direction. For this purpose it is necessary that he should be mounted on a horse which will carry him safely and quickly for several miles across the most difficult country. The leader of a cavalry detachment, whether large or small, is similarly situated. If he knows that neither he nor his subordinates are able to get along over even only difficult ground, this alone will be sufficient to prevent his advancing at all against the enemy. For this purpose the horse that can go a distance is alone not sufficient; we have seen that for a distance ride even cart-horses were used, which travel very well along the roads, but are of very little use across country. The horse which is required must have been accustomed in peace time, by being hunted, to carry his rider over intricate ground. My opinion, therefore, is that, without condemning distance rides, we should lay greater stress on hunting, and especially on such hunts as were organized in Hanover under General von Krosigk. What this General accomplished in this respect with the Service horses had, up to the time, been unknown to us, and he had produced something eminently useful for our purposes. The money that is lost on such distance rides will, in my opinion, repay itself better in war, if it is expended in hunting. I think, without presuming, that I may give an opinion. In the days of my youth, when both railways and high roads were scarce, it used to be much more the custom than now to ride long distances over frosty country roads to a ball, returning the same night. I remember, shortly before my betrothal, covering a distance of 55 miles from Zduny to Neumark (between Breslau and Liegnitz) both there and back under above conditions of road; nevertheless I am sure that for purposes of war I learnt more whilst out hunting in later years.

Still, the performances of all who arrived at the winning post were unexpectedly brilliant. He who has covered 85 German miles in 100 hours may well be proud. Only those who have executed a similar ride should venture to give an opinion. Those who, in this respect, are without experience, should accept facts, but forbear from expressing an unfavourable judgment on a late arrival. If Mr. v. Reitzenstein, as appears now, without doubt, made a detour of 7 German miles, and, therefore, covered 92, *i.e.*, 391 miles in 73 hours and 6 minutes, we can only be amazed at his performance, and hardly judge it. It may be as well to mention that the impression made by the arrival of the Austrian Officers on all who were present at the Custom House was really overpowering and most imposing. The horses throughout were surprisingly fresh, and were only surpassed in this respect by their riders; none of the gentlemen showed a sign of fatigue. Everybody was elated on seeing the slight, smart, elastic figures, with their handsome young faces beaming with delight. I feel sure that all feelings of ill-will and envy, if they existed in anybody's mind, were chased away by the appearance of these gentlemen. Involuntarily the thought arose in one's mind that, if the Austrian cavalry can be judged by these Officers, it must have arrived, in

respect of horsemanship, endurance, and energy, at a very high degree of excellence, and probably be the best in the world.

In Austria there are, compared with us, few riding schools; the training altogether is not based on the riding school, but on the open ground, and this will perhaps be referred to in a second similar essay. In the meantime, a hearty cheer for all Officers, without exception, Austrians and Germans, who have passed the winning post!- -
V. ROSENBERG.

EXPERIMENTAL ALUMINIUM HORSE-SHOES.

Translated from the "Invalide Russe" by Captain E. LAMBART, R.H.A.

IN the Finland Dragoons an experiment has been made with aluminium horse-shoes. A few horses were chosen and shod with one aluminium shoe and three iron shoes, the former being on the fore foot in some cases, and on the hind in others. Some of the horses were remounts working only in the school, and others fully trained horses. The experiments lasted six weeks, and showed that the aluminium shoes lasted longer and preserved the foot better than the iron ones. No aluminium shoes broke, and they were used over again for re-shoeing. The horses were worked over hard and very stony ground. It had been feared that the aluminium shoes would suffer from contact with urine, and that the shoeing would suffer from the acid products, but this was not found to be the case. To try this fully, pieces of the metal were kept a whole month in urine, but no chemical change took place in them. A very trifling loss of weight was observed.

The aluminium shoes are only one-third to one-fourth the weight of iron shoes. Their cost is certainly greater, but this is to some extent compensated for by the facts that very little charcoal is required in shoeing, that there is no loss in weight, and that the value of the old metal is the same as that of fresh. In making the shoes some skill is required, as the forging must be done at a rather low but exactly regulated temperature. This also makes the operation a rather lengthy one.

Taking into consideration the importance of light shoes, especially for horses doing fast work, and the advantage of being able to carry a larger number of spare shoes on a campaign without increasing the load of the wagons, and, lastly, the probability of a fall in the price of aluminium, it is safe to predict the general introduction in the future of this metal for the shoeing of cavalry and artillery horses.

REGULATIONS FOR MOBILIZATION FOR HOME DEFENCE (REGULAR FORCES).

THE Regulations for this most important work have recently been issued with a Special Army Order. Nominally, the audience addressed by an Army Order is very large indeed; not unfrequently the audience is limited in practice to a select few. It is, however, desirable that, in this instance, at all events, as many minds as possible should be induced to study the subject of the Special Army Order, and to understand the Regulations, for it is on the thorough co-operation of numbers of individuals that depends the satisfactory working of the machine, if ever it be called into play; and for the work, every one who will have to take part in it should be prepared beforehand.

Moreover, mobilization for home defence is not merely a military matter affecting the profession only; it affects, in many ways, the civil population also, and, in fact, demands their co-operation. It would be very difficult for the military authorities to provide for the collecting, transporting, equipping, billeting, and feeding of the Reservists in Great Britain and Ireland, unless not only the civil authorities, but civilians all over the country, gave them their cordial aid and assistance; without aid and assistance rendered in this spirit, fatal friction and delay must ensue. Further, it is not impossible that, notwithstanding the immense amount of labour and care bestowed on drawing up the Regulations, some little error may have crept into them, or some rather round-about method in lieu of a shorter one introduced, here and there, into them; and if this be the case, then it is only necessary for the existence of the flaws to be made known in order that they may be remedied. These Regulations are administrative rather than disciplinary, they are as much national as military, and it is with the view of not letting them be buried out of sight in volumes of Army Orders, but of giving them as much general publicity as possible, that permission has been obtained from the Controller of Her Majesty's Stationery Office for the insertion of the Regulations, *in extenso*, in the pages of the Journal of the Royal United Service Institution. It is suggested that "Mobilization by the Regulations" would be by no means a useless, uninteresting, or unpractical form of *kriegs-spiel*, to while away an evening in each district during the winter season.—L. A. H.

| Issued with Special Army Order, dated 10th August, 1892.

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REGULATIONS

40116

3306

FOR

MOBILIZATION

FOR

HOME DEFENCE

(REGULAR FORCES).

INSERTED BY PERMISSION OF THE CONTROLLER OF HER MAJESTY'S
STATIONERY OFFICE.

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REGULATIONS FOR MOBILIZATION FOR HOME DEFENCE (REGULAR FORCES).

PREAMBLE.

1. Before entering upon the detailed regulations for the mobilization of the Regular troops for home defence in Great Britain and Ireland, it will be well to explain briefly the general principles on which they are framed.

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I.—Field Army.

2. Owing to the exigencies of service abroad, the troops of the British Army cannot be grouped together in fighting formations in the same manner as are those in other armies. It is not possible to lay down that an Army-Corps shall consist of certain definite regiments, batteries, departmental units and the like, because if this were done, it would be found, when this Army-Corps had to be constituted on mobilization, that a large proportion of its component units were abroad. The organization of the fighting formations has, therefore, to be effected on the basis of stations and not of units ; that is to say, that a given formation, a Brigade for instance, will not be made up of definite units, but of the units quartered at definite stations.

3. On mobilization Reservists will join at the places shown in the table in Appendix D, which are, except in the cases of specially-circumstanced corps, the depôts of the regiments or corps to which they belong. The Reservists will receive their clothing and necessaries at these places, and will be posted to the units in which they are to serve by the Officer Commanding Reservists,* who, after seeing them clothed and their accounts settled up, will despatch them to their units, except in cases where both battalions are abroad (*vide* paragraph 48).

4. The number of Reservists required by each unit is ascertained from periodical returns furnished by Officers Com-

* A schedule of these Officers and explanations of various terms used in these Regulations will be found in the Appendices.

manding units. Any men serving with the units who are unfit for service will be sent to the depôts, leaving their arms and accoutrements with the unit. Any Reservists who are not immediately required by units will remain at the depôts.

5. The Reservists on joining their units from the depôts will receive their arms and accoutrements, which will be drawn by Officers Commanding units from the mobilization storehouses at the stations of the units; and will also receive the special articles of clothing and necessities issued on mobilization (*vide* paragraph 11).

6. The clothing and necessities required by Reservists on joining will be despatched direct to depôts and other places mentioned in the table in Appendix D, by the Director of Army Clothing, Pimlico. Those special articles of clothing which are required on mobilization by men serving, and which they are not in possession of during peace, will be forwarded from Pimlico to Officers Commanding units (*vide* paragraph 11).

7. Any Reservists who may remain at the depôts as not being immediately required by units, as also all the men sent from units to depôts as being unfit, from youth or other causes, for field service will receive their arms and accoutrements at the depôts. For this purpose a supply of arms and accoutrements is kept at Infantry Depôts in charge of the Commanding Officers, and at Garrison Artillery Depôts in charge of the Ordnance Store Department.

8. In any case in which the Reservists of a unit are not sufficient to bring it up to war establishment, the deficiency will be made up, as far as possible, by drawing on the men at the depôt who are fit for service.

9. In addition to the personal outfit of the men, the unit itself has to be furnished with its own war equipment of the various articles required to enable it to take and keep the field as a fighting body. The additional stores required for war are divided into classes, and their storage in peace time and issue on mobilization, depend upon the class to which they belong.

10. The classes into which the war outfit of the troops of the Field Army is divided are three in number, namely :—

- (1.) The *Personal Outfit* of the soldier, which consists of his clothing and necessities, furnished by the Army Clothing Department; and his personal equipment, viz., arms and accoutrements, which are furnished by the Ordnance Store Department.

- (2.) The *First Regimental Equipment* of the unit, which consists of cooking utensils, butchery implements, harness and saddlery, entrenching tools, &c., and the vehicles in which these are carried. A complete list of what constitutes first regimental equipment is given in the Equipment Regulations.
- (3.) The *Second Regimental Equipment* of the unit, which consists of the mobilization supply of ammunition, the vehicles in which this is carried, supply wagons, ambulance wagons, and water carts. A complete list of what constitutes second regimental equipment is given in the Equipment Regulations.

11. *Personal Outfit*.—The clothing and necessaries for the Reservists of each regiment or corps are kept at the Army Clothing Department, Pimlico, and will, on mobilization, be despatched by the Director of Army Clothing to the places mentioned in the table in Appendix D, so as to arrive at these places before the Reservists join. The amount of clothing and necessaries to be sent will be based on the total number of the Reservists of the regiment or corps concerned, joining at each station, and demands will not be required. Those special articles of clothing and necessaries (flannel belts, pots of grease, housewives, field-dressings, clasp-knives and lanyards) which are required on mobilization, but do not form part of the soldier's peace kit, will be forwarded from Pimlico to Officers Commanding units, the numbers being calculated in each case on the war establishment of the unit.

Thus a Reservist on joining will receive the ordinary peace kit of clothing and necessaries at the dépôt at which he joins. The special articles required for field service will be issued to him when he reaches his unit.

For those Reservists that are not sent to units, and for any other men remaining at, or sent to the dépôt, the special articles of clothing for field service will be demanded by the Officer Commanding the dépôt, from the Army Clothing Department.

The arms and accoutrements for the difference between the peace and war establishment of each unit are kept at the place of mobilization of the unit in Ordnance Store Department charge.

12. *First Regimental Equipment*.—This equipment is kept at the place of mobilization of each unit in Ordnance Store charge.

13. *Second Regimental Equipment*.—This equipment is kept in Ordnance Store charge at selected places, shown for each unit in the Mobilization Tables.

14. *Medical and Veterinary Stores.*—In addition to the above there are a few articles, viz., certain medical and veterinary stores which are held by the departments concerned, and issued on mobilization to Medical and Veterinary Officers. The details of these are given in the Medical and Veterinary Regulations.

15. *Horses.*—The horses required to complete units on mobilization will be collected at fixed horse-centres by the Inspector-General of Remounts, and will be sent for by each unit under orders from him.

Procedure on Mobilization for Units in the Field Army.

16. In the preceding paragraphs the system under which each unit is placed on a war establishment of men is explained. The personal and first regimental equipment will be drawn from the Ordnance Store Department at the place of mobilization. The horses required by the unit will be sent for by the Commanding Officer, who will despatch a party to fetch them from the centre indicated in the Mobilization Tables on receipt of an intimation from the Inspector-General of Remounts that the horses are ready. On the return of this party with the horses, the harness and saddlery will at once be fitted. A party with the requisite number of horses fitted with harness, will then be sent to the place where the second regimental equipment is kept to draw it from the Ordnance Store Department, and convey it to the concentration place of the unit. The unit itself will, after the despatch of this party, proceed to its place of concentration under orders from the General Officer Commanding the District. At the concentration place it will be joined by the party which has drawn the second regimental equipment, and its mobilization will be completed. On leaving its peace station the unit comes under the orders of the Officer Commanding the Brigade, or other formation to which it is allotted in the Mobilization Tables.

17. In the Artillery the mobilization of the unit will proceed as in the preceding paragraph, with the exception that there is no second regimental equipment for Artillery batteries, the complete war equipment being at all times in charge of the battery (*vide* Equipment Regulations, Part 2, Section XI., paragraph 15, *et seq.*). Batteries will not therefore have to send parties to the second equipment storehouses, but will leave their peace stations complete for the place of concentration.

18. The above are the general rules guiding the mobilization arrangements for the Regular Troops in the Field Army. The special instructions required for those units which have to be constituted on mobilization are given on paragraphs 85, *et seq.*

II.—Garrisons.

19. The units for garrisons are detailed by stations in the same way as for the Field Army. Owing, however, to their more stationary condition, and also to the fact that they have the resources of large towns at their disposal, their equipment on mobilization will be of a more limited nature than that assigned for units in the Field Army. It will consist solely of the personal outfit of the soldier, of ammunition, and of the barrack or camp equipment required, according as the unit is quartered in barracks or encamped.

20. A certain number of military vehicles and of tools for entrenching purposes are assigned to each garrison, and these, when mobilization is ordered, will be at the disposal of the General Officer Commanding the District, and will be allotted by him in accordance with his detailed schemes of defence. Any further transport or tools that may be required will be obtained by him from civil sources. The personal outfit is kept in the same way as for troops of the Field Army. The ammunition, barrack or camp equipment, vehicles, and tools are kept at the places which the units are allotted to garrison.

Procedure on Mobilization for Units allotted to Garrisons.

21. The procedure on mobilization for units allotted to garrisons will be the same as regards the Reservists joining, and their being equipped with their personal outfit, as for units of the Field Army. In almost all cases, regular units allotted to garrisons are quartered in the fortresses to which they are allotted, and will draw from local stores any camp or barrack equipment required by them on mobilization. A unit which has to join a garrison from elsewhere, will move to it as soon as it is complete in numbers and in personal outfit, under orders which will be given to it by the General Officer Commanding the District. On arrival there it will draw its barrack or camp equipment, according to circumstances, and its mobilization will then be completed. (*Vide* Appendix F.

III.—Unallotted Units.

22. Besides the units allotted to the Field Army and to garrisons on mobilization, a certain number of units are kept in hand and not assigned definitely to any particular duties; these are termed unallotted units, and a list of them is given in Appendix G.

Procedure on Mobilization for unallotted Units.

23. On mobilization unallotted units will be brought up to war establishment of men in the same way as other units. Cavalry and Artillery units will receive horses for the difference between peace and war establishment, excluding those required for regimental transport purposes. Cavalry will draw saddlery for these additional horses, but with this exception, no unallotted units will receive any regimental mobilization equipment.

24. The personal equipment, and, in the case of Cavalry, the saddlery, will be kept by the Ordnance Store Department at the peace station of the unit in the same way as for units allotted to the Field Army or to garrisons.

25. Any extra barrack or camp equipment required by unallotted units to meet their increased strength will be drawn from local stores at their stations.

IV.—Routes.

26. Routes will be required on mobilization for the movement of men unfit for service from the units to depôts; for the movement of Reservists from depôts to units: movement of horse-collecting parties from units to remount centres, and back with the horses; movement of parties for second regimental equipment from units to storehouses, and thence, with the equipment, to rejoin their unit at its concentration place; movement of units from their places of mobilization to their places of concentration. There will be also a number of miscellaneous movements, such as parties detailed for Mounted Infantry from their units to Aldershot and the Curragh, and parties of military police and others detailed to staff units.

Special instructions for the preparation and issue of these routes will be issued to General Officers Commanding Districts.

DETAILED REGULATIONS.

PREPARATORY MEASURES DURING PEACE.

I.—Officers and Men.

27. The Adjutant-General will keep Officers Commanding units informed, through General Officers Commanding Districts, of the numbers of Officers and men that they will be required to furnish, on mobilization, for the following services :—

Army-Corps, Divisional, and Brigade Staffs, Remount Depôt, Sick Horse Depôt, Mounted Infantry, Farriers, and Military Police.

28. Every Officer Commanding a unit will render, on the 15th June and 15th December of each year, to the Officer Commanding the Reservists of his unit, a return showing the numbers of each rank, exclusive of Officers, required to complete the unit to war establishment for active service at home, after deducting men—

(a.) Who are not fit for service for home defence (*see* paragraph 49).

(b.) Who are required for the special services named in paragraph 27.

In the case of Royal Engineer units this return will be sent to the Deputy Adjutant-General, Royal Engineers, War Office, and in the case of both Royal Engineers and Army Service Corps it will show the number of each trade required.

29. In the case of a unit which is detailed to find a machine-gun section, the number of men required for it must be added to

the war establishment of the unit, in order that Reservists may be provided to meet this requirement.

30. Separate lists of those Cavalry Reservists who are artificers, or who have been trained as farriers at the Veterinary School, Aldershot, will be kept by the Commandant, Cavalry Dépôt, Canterbury, who will detail them for service with the units requiring them on mobilization.

II.—Horses.

31. The provision of horses on mobilization will be carried out by the Inspector-General of Remounts.

32. The remount centres from which units will draw their horses on mobilization are shown in the Mobilization Tables.

33. The Officer Commanding a unit will keep always detailed the party to fetch its horses on mobilization. The strength of this party will be based on the average requirements of the unit in horses, at the rate of one man to every two horses, with a proper proportion of Officers, non-commissioned officers and shoeing-smiths, when possible. Men accustomed to horses should be selected as far as possible.

III.—Equipment, Clothing, &c.

34. As already stated, the war outfit of the troops of the Field Army is divided into three classes, namely—Personal Outfit, First Regimental Equipment, and Second Regimental Equipment. The clothing and necessaries which form part of the personal outfit have been dealt with sufficiently in paragraph 11.

35. Printed lists of the ordnance stores required by each unit on mobilization, arranged in accordance with this classification, are issued to Officers Commanding units. Copies of these lists are kept with the stores for each unit, as are also demands for the stores ready filled in, which latter, after signature by the Officers concerned, will be passed as vouchers (*vide* Appendix K).

36. Soldiers already serving, when mobilized for service at home, may be assumed to be complete in personal outfit as issued for peace, and will require in addition only such special articles as are issued solely for active service, as detailed in Clothing and Equipment Regulations.

37. Reservists will in all cases require a complete set of personal outfit.

38. The mobilization stores required as first and second regimental equipment are kept separate for each unit in Ordnance Store Department charge; the first at the place of mobilization of the unit, and the second at a selected place, as detailed for each unit in the Mobilization Tables.

39. The barrack or camp equipment required for a unit allotted to a garrison, is stored at the garrison to which it is allotted.

40. Grocery panniers, empty, form part of the first regimental equipment of units, and, as such, are held by the Ordnance Store Department at the stations laid down for each unit in the Mobilization Tables. The groceries for one day's ration per man to fill the panniers will, on mobilization, be provided locally by the Commanding Officer of each unit.

41. The medical comfort panniers which form part of the first regimental equipment of Bearer Companies and Field Hospitals are kept at the Reserve Supply Depôt, Woolwich, and on mobilization will be despatched by the Officer in charge of the Reserve Supply Depôt, packed, to the Officer Commanding each unit concerned, at its place of mobilization.

IV.—Documents.

42. All Officers in charge of documents to be issued on mobilization, will keep them filled in up to date, as far as practicable.

43. Army Forms, as scheduled below, are to be kept in charge of the Officers named.

Officer.	Description of Form.	Number to be kept in stock.
Officers Commanding Reservists.	Posters calling out Reservists (D 427) and (D 451).	No. of places for which posters would be required + 10 per cent.
Officers paying Reservists.	Army Form (D 463) (Notice to Reservists to join).	No. of Reservists paid + 20 per cent.
	Army Form (D 457) envelope for addressing Reservists.	No. of Reservists paid + 20 per cent.
	Railway and Passage Warrants..	No. of Reservists paid + 20 per cent.

ORDERS TO MOBILIZE.

44. The order for mobilization will be issued from Head-Quarters to General Officers Commanding Districts, and direct to Officers Commanding Reservists.

45. General Officers Commanding Districts, on receipt of the order from the Head-Quarters, will immediately inform Officers commanding units, and will at once take steps to secure the return to the head-quarters of their units of all Officers and men on leave, or on detachment, or on other duties, as soon as they can be spared.

V.—Procedure to be followed on receipt of Orders to Mobilize.

46. As already explained, the general rule is that on mobilization Reservists will join the *depôt* of the regiment or corps to which they belong ; but to meet cases of particular corps the places where Reservists are to join are given in detail in Appendix D.

47. Reservists of the Foot Guards will report themselves at the Regimental Head-Quarters, Horse Guards, Whitehall, S.W., and will be posted to battalions, and clothed and equipped, under arrangements to be made by the Officer Commanding each regiment.

48. Reservists of Infantry regiments with both battalions abroad will join the *depôts* of their regiments, and Reservists of Cavalry regiments abroad will join at Canterbury. They will receive their clothing and necessaries at these *depôts*. Their further movements will be directed from Head-Quarters.

VI.—Fitness for Service for Home Defence.

49. All soldiers will be considered fit for service for home defence who—

- (1.) Are in the opinion of the Commanding Officer capable of bearing arms, and
- (2.) Have completed a recruit's course of musketry (in the cases of men to whom this is applicable).

In the Army Service Corps and Departmental Corps the first condition only is requisite.

In the Royal Engineers, Sappers, in addition to the above qualifications, must have received instruction in field works or equivalent Engineer duties, or possess other special qualifications.

VII.—Duties of Officers Commanding Units,* on receipt of Orders to Mobilize.

On receipt of the order to mobilize, the Officer Commanding a unit will—

50. Inform all Officers and soldiers on leave.
51. Arrange for a medical inspection of both Officers and soldiers.
52. Telegraph to the Military Secretary the number of Officers of each rank required to complete to war establishment, after deducting those unfit for service, or not available through being detailed for other duties.
53. In case any men are on command and cannot be spared to rejoin their unit, telegraph to Officer Commanding Reservists to fill their places with Reservists.
54. Arrange for receiving, accommodating (in barracks, tents, hired buildings or billets), equipping, and arming Reservists as they arrive from the depôt; and also for the accommodation of detachments called in from out-stations.
55. Draw from the Ordnance Store Department at the station, the arms and accoutrements for the Reservists, and the mobilization stores for the first regimental equipment of the unit.
56. If the unit is detailed to furnish a machine-gun section, draw the machine-guns and their equipment, if not already in charge of the unit.
57. Arrange for the accommodation in hired stabling, or by picketing, of the horses for which there is not stabling in barracks.
58. On receipt of instructions from the Inspector-General of Remounts, send a collecting party at the rate of one man to every

* In the Foot Guards these duties will be carried out by, or under the orders of, the Officers Commanding regiments.

two horses, with a proper proportion of Officers, non-commissioned officers and shoeing-smiths, when practicable, with head-collars, head-ropes, T-bits and nosebags to the remount centre indicated in the Mobilization Tables, to receive the horses and return with them to the unit. This party will take with them any unfit horses of the unit that can travel, and hand them over to the Remount Officer, with Army Form B 88 and Veterinary History Sheets. Horses unfit to travel will be disposed of locally, or destroyed.

59. Arrange for the harness and saddlery being fitted to the horses as soon as they are received.

60. As soon as sufficient harness is fitted, send a party under proper charge, with the requisite number of horses, to the place where the second regimental equipment is stored to draw it, and rejoin the unit at the place of concentration.

61. Send to the dépôt all Officers and men unfit for service who can travel.

62. Send to their homes, or to the place of residence they may select in the United Kingdom, all soldiers' wives and families, except those of men proceeding to the dépôt, who will accompany the men.

63. As soon as the unit is ready to proceed to its place of concentration, telegraph the fact to the General Officer Commanding the District.

VIII.—Duties of Officers Commanding Reservists on receipt of Orders to Mobilize.

On receipt of the order to mobilize, an Officer Commanding Reservists will—

64. Arrange with municipal, parochial, and police authorities and postmasters for causing placards (Army Forms D 427, or D 451) to be posted without delay on the doors of town-halls, churches and chapels, police barracks, on the gates of military barracks, and in the windows of post offices.

65. Inform all Officers and soldiers under his command who are on leave.

66. Arrange for a medical inspection of Officers and soldiers serving at the dépôt, or under his command.

67. Arrange for the receipt and care of the clothing and necessities for Reservists, which will be sent from Pimlico.

68. Arrange for receiving, accommodating (in barracks, hired buildings, tents or billets), medically inspecting and clothing Reservists as they join.

69. See that Reservists on joining are at once settled with, up to the day preceding joining, for their Reserve pay and Reserve deferred pay, minus any forfeitures, stoppages or advances.

70. Take the necessary steps to record the absence, without leave, of such Reservists as fail to report themselves (*see* Sections 19 and 24 (3) of the Reserve Forces Act, 1882).

71. Ascertain from the Reservists joining whether they are married or not, or widowers with children. In the case of a man stating that he is married or a widower with children, although no entry appears on his documents, require him to make a declaration to that effect, and pass this declaration to the Officer paying the Reservist (Army Form D 418).

72. Arrange for accommodating in barracks, hired buildings, tents, or billets, the men and soldiers' families sent to the dépôt from the units.

73. If the Reservists are not sufficient to bring a unit up to war establishment, the Officer Commanding the dépôt will make up the deficiency, as far as possible, by sending to the unit all men at the dépôt fit for service who are not absolutely required there.

74. Reservists will be sent to units from the depots or other places where they join, as soon as they are clothed and supplied with necessities. They should, as a rule, be sent in parties of from 50 to 100 strong, but the Officer Commanding Reservists is left full discretion as to the strength of a party, which must depend on the rate at which Reservists join, and other considerations. A party may be sent under a non-commissioned officer, if no Officer is available for the duty.

IX.—Duties of Officers paying Reservists on receipt of Orders to Mobilize.

On receipt of the order to mobilize, an Officer paying Reservists will—

75. Complete and send in one envelope (Army Form D 457) by post to each Reservist the following documents—

*(a.) Notice (Army Form D 463, signed by him for the Officer Commanding Reservists).

(b.) Railway and passage warrants as required.

*(c.) Postal Order for 3s.

76. The railway or passage warrants are to be made out for the quickest route.

77. On the despatch of a party of Reservists to join a unit, send by the conducting Officer, if there is one, and if not, by post, the following documents, properly completed, to the Officer Commanding the unit concerned :—

(d.) Nominal Roll of the Party.

(e.) Army Form O 1811 for each Reservist.

(f.) The documents of each Reservist, when they are in the Paying Officer's possession.

78. In the Royal Engineers the documents referred to in paragraph 78(f) will be sent by the Assistant Superintendent, Royal Engineers Records, Chatham, and, in the Army Service Corps the documents referred to in paragraph 78(d), (e), and (f) will be sent by the Officer in charge of Army Service Corps Records, Woolwich Dockyard.

79. Cavalry Reservists who have been trained as farriers at the Veterinary School, Aldershot, or who are artificers, will, after receiving their clothing and necessaries at Canterbury, be sent to the corps to which they are detailed (*see* paragraph 20).

80. Reservists of the Medical Staff Corps will be ordered to report themselves to the Senior Medical Officer at the station where they join.

* It is intended to issue a special Army Form combining these two documents in one.

X.—Command on Mobilization.

81. Units allotted to the Field Army will remain under the General Officer Commanding the district in which they are, until they leave their place of mobilization *en route* to their place of concentration. On leaving their place of mobilization they will at once be considered as belonging to the Field Army, and will come under the command of their respective Brigadiers or other General Officers.

82. Units allotted to garrisons will similarly pass under the command of the Officer Commanding the garrison to which they are allotted when they leave their peace stations for their garrisons.

83. Unallotted units will remain under the General Officer Commanding the District in which they are stationed.

UNITS TO BE FORMED ON MOBILIZATION.

84. The units to be formed on mobilization are—

Brigade, Divisional, and Corps Staffs.
 Regimental Staffs of Corps Artillery and Corps Engineers.
 Mounted Infantry.
 Army Signallers.
 Ammunition Columns.
 Bearer Companies and Field Hospitals.
 Remount Centres and Sick Horse Depôts.
 Stationary and General Hospitals.
*Post Office Corps.**
*Military Police.**

85. *Brigade, Divisional, and Corps Staffs.*—The Officers to compose these Staffs are detailed by the Military Secretary; the non-commissioned officers and men are detailed by the Adjutant-General. The equipment, exclusive of transport, is kept in charge of the Ordnance Store Department at the places given in the Mobilization Tables. The General Officer of each Staff will detail one of his Staff to take over this equipment, and will issue his own orders as to the assembly of his Staff. The Officer detailed to take over the equipment will thus become an Accounting Officer. The transport (*i.e.*, the horses, wagons, and drivers) is provided by the Army Service Corps, and will join the Staff units at their respective places of mobilization, according to the detail laid down in Field Army Establishments (Home Defence).

86. *Regimental Staffs of Corps Artillery and Corps Engineers.*—The Officers to compose these Staffs are detailed by the Military Secretary, and the non-commissioned officers and men by the Deputy Adjutant-General, Royal Artillery, and Deputy Adjutant-General, Royal Engineers, respectively. The equipment, including transport, is kept by the Ordnance Store Department at the places given in the Mobilization Tables. The Officer Commanding each Staff will detail one of his Officers to take over this equipment as an Accounting Officer, and will issue his own orders for the assembly of his Staff. The horses will be provided by the Inspector-General of Remounts.

87. *Mounted Infantry.*—The Mounted Infantry to be formed on mobilization will consist of eight companies, and four machine-gun sections, *viz.*, six companies at Aldershot with three machine-gun sections, and two companies at the Curragh with one machine-gun section. They will be formed entirely from men serving, with the exception of the serjeant-farriers.

* The detachments of these corps are not treated as units, but form part of the various Staff units.

88. The artificers for the Mounted Infantry will be found from among the detachments detailed to compose it, with the exception of the serjeant-farriers, who will be furnished from Cavalry Reservists, and are detailed by the Officer Commanding Cavalry Depôt, Canterbury.

89. The peace composition of the companies of Mounted Infantry will remain unaltered on mobilization. Any vacancies in a division of a company which has to mobilize will be made up regimentally, the Officer Commanding the battalion concerned detailing the most suitable untrained men.

90. The Officer Commanding the Mounted Infantry will submit to Head-Quarters, on the 1st March and 1st September in each year, the detail of the eight companies and four machine-gun sections which he proposes should be those to mobilize for home defence. The Officers Commanding the battalions concerned will then be notified by the Adjutant-General, and on mobilization each battalion will send off its division complete in numbers, to the place of mobilization, without further orders.

91. The arms and accoutrements and first and second regimental equipments are kept in Ordnance Store charge at Aldershot and the Curragh ; consequently men will bring with them from their battalions their clothing and necessaries only. On mobilization the Officers Commanding battalions which have to furnish divisions, will despatch them to Aldershot and the Curragh, respectively. The Officer Commanding Cavalry Depôt, Canterbury, will direct the Reservists detailed as serjeant-farriers to proceed to these places after receiving their clothing and necessaries. The outfitting, drawing of horses, &c., will then proceed as laid down in paragraph 16. The special articles of clothing required for Mounted Infantry will be despatched from Pimlico by the Army Clothing Department to Aldershot and the Curragh, at which places they will be exchanged for the articles of regimental clothing worn by the men. These will be returned by the Officer Commanding Mounted Infantry to the depôts of the regiments.

92. *Post Office Corps.*—The detachments of this corps which form part of the Staff units of the various formations to which they are allotted, are provided by the 24th Middlesex Volunteer Rifle Corps. The clothing and necessaries required by these detachments will be forwarded on mobilization by the Army Clothing Department to the Officer Commanding 24th Middlesex Volunteer Rifle Corps. The remainder of the personal equipment is kept at the Head-Quarters of the 24th Middlesex V.R.C., while the rest of their equipment is included in the equipment of the various Staff units, and will be drawn by the Accounting Officer of each Staff. After receiving their personal

equipment the various detachments will proceed direct to their concentration places, and will there join the Staffs to which they respectively belong.

93. *Ammunition Columns*.—A nucleus of one Warrant Officer and six men, Royal Artillery, has been formed for each Ammunition Column. To this nucleus is assigned the care and custody of all the equipment of the Ammunition Column. The places where the equipment for the different columns is kept are shown in the Mobilization Tables. The Officers for the columns are detailed by the Deputy Adjutant-General, Royal Artillery, from Officers serving. The non-commissioned officers and men are similarly detailed by the Officer Commanding Horse and Field Artillery, Woolwich, from men serving, and from Reservists of these branches of the Royal Artillery. On mobilization the Officers and men serving will proceed at once to the places of mobilization of their columns, and the equipment will be drawn from the Ordnance Store Department. The Reservists will be ordered to join at Woolwich, where they will receive their clothing and necessaries. They will then be sent to the place of mobilization. Horses will be drawn from the Remount Department, and the mobilization of the column will be completed in the same way as for other units.

94. *Military Police*.—The Military Mounted Police required on mobilization is formed from the Corps of Military Mounted Police and from the Cavalry Reservists serving in the Metropolitan Police. The personal outfit and saddlery for these latter (with the exception of clothing and necessaries which will follow the general rule and be supplied from the Army Clothing Department to the Cavalry Dépôt at Canterbury) is kept at Aldershot, and on mobilization the Officer Commanding the Cavalry Dépôt will send the Cavalry Reservists recalled from the Metropolitan Police to this place, after issuing to them their clothing and necessaries. At Aldershot they will receive their personal equipment, and the various detachments of Mounted Military Police required will be told off by the Officer Commanding Mounted Military Police, and will then proceed to their concentration stations. Their remaining equipment is included in that of the Staffs of the formations to which they are detailed, and will be seen to by those Staffs. The horses required on mobilization will be provided at Aldershot by the Inspector-General of Remounts.

95. The Military Foot Police is formed from the men of this corps serving in peace time, and its Reservists, who will be ordered to join at Aldershot. The various detachments required are told off by the Officer Commanding the corps, and on mobilization will be sent from Aldershot and other stations to their concentration stations. The clothing and necessaries for the Reservists will be sent to Aldershot by the Army Clothing

Department. The personal equipment is kept at Aldershot, and the remainder is included in that of the various Staff units, and will be seen to by those Staffs.

96. *Bearer Companies and Field Hospitals.*—The mobilization of these units will be carried out by the Medical Officer appointed to the command of each, on the same system as for other units, except that the Medical Officers and men allotted to each unit will be collected at the various places of mobilization, in accordance with detailed instructions issued by the Director-General, Army Medical Department. The Reservists of the Medical Staff Corps will be ordered to join at certain fixed stations, in accordance with the requirements of the medical services at these places. Clothing and necessaries will be supplied by the Army Clothing Department to the places where Reservists are to join. Arms and accoutrements are kept by the Ordnance Store Department at these places for the Reservists, while men serving will retain their own arms and accoutrements on transfer to field units. The ordnance stores required by Bearer Companies and Field Hospitals are kept by the Ordnance Store Department at the places shown in the Mobilization Tables, while the Medical Stores will be sent direct to the units at their places of mobilization from the Army Medical Stores at Woolwich (Herbert Hospital). Medical comfort panniers are kept at Woolwich Dockyard, and will be sent on mobilization to units, packed complete, by the Officer in charge, Supply Reserve Depot.

97. The transport for Bearer Companies and Field Hospitals is provided by the Army Service Corps, as detailed in the Field Army Establishments (Home Defence), and the necessary equipment is kept by the Ordnance Store Department on account of the respective Army Service Corps Companies.

98. *Stationary and General Hospitals.*—These will be organized for garrisons by General Officers Commanding Districts as part of their schemes of defence; arrangements will be made at Head-Quarters to meet the requirements of the Field Army.

99. *Medical Staff and Medical Staff Corps allotted by Garrisons.*—The Medical Officers, and men of the Medical Staff Corps who are allotted to garrisons, will be detailed to duties in the garrisons under the direction of General Officers Commanding Districts in accordance with their schemes of defence.

100. *Army Signallers.*—The equipment for these companies, except clothing and necessaries, is kept by the Ordnance Store Department. The companies will be formed on mobilization under orders from Head-Quarters.

101. *Remount Centres and Sick Horse Depôts.*—These will be organized under orders from Head-Quarters.

TREATMENT OF MEN FOUND UNFIT FOR BEARING ARMS.

102. The Commanding Officer will decide as to the fitness or unfitness of men for bearing arms (*see* paragraph 49) after receiving the report of the medical examination. This report will specify any men considered as permanently unfit.

103. Men rejected as temporarily unfit will—

Be sent to hospital for treatment, or be sent to the dépôt (if not already there), according to the nature of their case.

104. Men rejected as permanently unfit will—

Be at once discharged under Section XIX., Queen's Regulations.

These men, if not in hospital with diseases that would be prejudicially affected thereby, should be sent on furlough pending confirmation of discharge.

APPENDICES.

DEFINITIONS AND SCHEDULES.

- A.—Explanation of Terms used.
- B.—Schedule of Officers Commanding Reservists.
- C.—Schedule of Officers Paying Reservists.
- D.—Schedule of Places where Reservists of the various Corps are to join on Mobilization.

MOBILIZATION TABLES.

- E.—Detail of Field Army.
 - F.—List of Regular Units allotted to Garrisons.
 - G.—List of Unallotted Regular Units.
 - H.—List of Regular Units serving at Home, showing the allotment of each Unit on Mobilization.
 - J.—List of Regular Bearer Companies and Field Hospitals in the Field Army, showing the Companies of Medical Staff Corps from which each is formed.
 - K.—Schedule of the Lists of Ordnance Stores required by Units, &c., on Mobilization, referred to in paragraph 35 of the Mobilization Regulations.
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APPENDIX A.

EXPLANATION OF TERMS USED.

1. Each of the following constitutes a "unit," viz. :—

- A regiment of Cavalry (including a machine-gun section, where there is one).
- A battery of Horse, Field, or Mountain Artillery.
- A company of Garrison Artillery.
- The District Establishment, R.A., in a Military District.
- A Field Company, R.E.
- A Field Park, R.E.
- A Fortress Company, R.E.
- A Railway Company, R.E.
- A Mounted Detachment, R.E.
- A Troop, Bridging Battalion, R.E.
- Half Telegraph Battalion, R.E. (head-quarters and four sections).
- A Balloon Section, R.E.
- A battalion of Infantry (including a machine-gun section, where there is one).
- A company, Army Service Corps.
- The Staff of an Army-Corps.*
- The Staff of a Division.*
- The Staff of a Brigade.*
- The Regimental Staff of Corps Artillery.*
- The Regimental Staff of Corps Engineers.*
- Two companies of Mounted Infantry (including a machine-gun section).*
- An Ammunition Column.*
- A Bearer Company.*
- A Field, Stationary, or General Hospital.*
- A company, Army Signallers.*
- A Remount Centre.*
- A Sick Horse Depot.*

2. Units printed above in *italics* do not exist, as such, in peace.

3. The Ordnance Store Corps, military police and postal detachments required for a Corps, Division, &c., are included in

the Staff Units of these formations ; they do not therefore appear as separate units.

4. The *place of mobilization* of a unit is the place where the unit is brought to its war establishment of Officers and men, and where its personal and first regimental equipment are kept in mobilization storehouses ; it is in nearly all cases the peace station of the unit.

5. The *place of concentration* is the place where a unit of the Field Army takes its station in the particular formation, *i.e.*, Brigade, Division, or Army-Corps, to which it is assigned. The places of concentration are not published in the tables herewith, but will be communicated to Officers concerned when mobilization is ordered.

6. In these Regulations the term Reservist means Army Reservist ; on mobilization for home defence, Militia Reservists will not join the Regular Forces, but will serve with their Militia units.

7. The machine-gun sections alluded to above are the sections allotted to Brigades and to Corps Troops ; for purposes of mobilization they are considered as part of the unit which provides the personnel of the sections ; each machine-gun section is equipped with two machine-guns ; the establishment of the section is in addition to the establishment laid down for the unit which finds it.

APPENDIX B.

SCHEDULE OF OFFICERS COMMANDING
RESERVISTS.

Corps.	Officers Commanding Reservists.
Cavalry	Commandant, Cavalry Dépôt, Canterbury.
Royal Artillery—	
Royal Horse Artillery ..	} Officer Commanding Dépôt, Royal Horse Artillery, Woolwich.
Riding Establishment ..	
Field Artillery—	
1st to 20th Battery ..	Officer Commanding 1st Battery, 1st Dépôt Division, Woolwich.
21st to 40th Battery ..	Officer Commanding 2nd Battery, 1st Dépôt Division, Woolwich.
41st to 60th Battery ..	Officer Commanding 1st Battery, 2nd Dépôt Division, Woolwich.
61st to 80th Battery ..	Officer Commanding 2nd Battery, 2nd Dépôt Division, Woolwich.
Mountain Artillery	Officer Commanding Dépôt, Western Division, R.A., Devonport.
Garrison Artillery, including District Establishments.	Officer Commanding Dépôt of the Division to which the Reservist belongs.
Regimental District Staff ..	} Officer Commanding Dépôt, Eastern Division, R.A., Dover.
School of Gunnery	
Detachment at Shoeburyness.	
Royal Engineers	Assistant Commandant, School of Military Engineering, Chatham.
Foot Guards	Officer Commanding each regiment, Horse Guards, Whitehall, S.W.
Infantry of the Line	Officer Commanding Regimental District of the Territorial Regiment.*

* For the King's Royal Rifle Corps and Rifle Brigade, the Officer Commanding Rifle Dépôt is the Officer Commanding the Reservists.

APPENDIX B—*continued.*

Corps.	Officers Commanding Reservists.
Army Service Corps	Assistant Quarter-Master-General, Head-quarters, Army Service Corps, War Office.
Ordnance Store Corps	Officer Commanding Head-quarters, Ordnance Store Corps, Woolwich.
Medical Staff Corps	Staff Officer, Medical Staff Corps, 18, Victoria Street, London, S.W.
Military Police	Assistant Adjutant-General, Alder- shot.
Post Office Corps	Staff Officer of Pensioners, Chelsea Hospital, London, S.W.

APPENDIX C.

SCHEDULE OF OFFICERS PAYING RESERVISTS.

Corps.	Officers paying Reservists.
Cavalry	Paymaster, Cavalry Depôt, Canterbury.
Royal Artillery—	
Royal Horse Artillery ..	} Station Paymaster, Woolwich.
Riding Establishment ..	
Field Artillery	
Mountain Artillery	Station Paymaster, Devonport.
Garrison Artillery, including District Establishments.	Station Paymaster paying the Depôt of the Division to which the Reservist belongs.
Regimental District Staff ..	} Station Paymaster, Dover.
School of Gunnery	
Detachment at Shoeburyness.	
Royal Engineers.. ..	Station Paymaster, Chatham.
Foot Guards	Staff Officer of Pensioners, Chelsea Hospital, London, S.W.
Infantry of the Line	Paymaster of the Regimental District of the Territorial Regiment.*
Army Service Corps	Station Paymaster, Woolwich.
Ordnance Store Corps	Station Paymaster, Woolwich.
Medical Staff Corps	Staff Officer of Pensioners, Chelsea Hospital, London, S.W.
Military Police	District Paymaster, Aldershot.
Post Office Corps	Staff Officer of Pensioners, Chelsea Hospital, London, S.W.

* For the King's Royal Rifle Corps and Rifle Brigade, the Station Paymaster, Winchester, is the Officer paying Reservists.

APPENDIX D.

**SCHEDULE OF PLACES WHERE THE RESERVISTS
OF THE VARIOUS CORPS ARE TO JOIN ON
MOBILIZATION.**

Corps.	Place where Reservists are to join.
Cavalry	Cavalry Depôt, Canterbury.
Royal Artillery—	
Royal Horse Artillery, including Riding Establishment.	} As ordered by Deputy Adjutant-General, Royal Artillery.
Field Artillery	
Mountain Artillery	Depôt, Western Division, Royal Artillery, Devonport.
Garrison Artillery, including District Establishments.	Depôt of the Division to which the Reservist belongs.
Regimental District Staff ..	} Depôt, Eastern Division, Royal Artillery, Dover.
School of Gunnery	
Detachment at Shoeburyness	
Royal Engineers	As ordered by Deputy Adjutant-General, Royal Engineers.
Foot Guards	Head-quarters of their Regiment, Horse Guards, Whitehall, S.W.
Infantry of the Line	Depôt of the Regiment to which the Reservist belongs.
Army Service Corps ..	} Supply—No. 18 Company, Army Service Corps, Aldershot. Transport—No. 1 Company, Army Service Corps, Aldershot.
Ordnance Store Corps	
Medical Staff Corps	Head-quarters, Ordnance Store Corps, Woolwich.
Military Police	As ordered by Staff Officer, Medical Staff Corps.
Post Office Corps	Head-quarters, Military Police, Aldershot.
	Head-quarters, 24th Middlesex V.R.C.

MOBILIZATION TABLES

FOR

HOME DEFENCE.

APPENDIX E.

DETAIL OF THE FIELD ARMY CONSISTING OF THREE ARMY-CORPS AND FOUR CAVALRY BRIGADES.

1. Units which are printed in *italics* in these tables do not exist as such in peace. They will be formed on mobilization.
2. Clothing and necessaries will be supplied direct from Pimlico as detailed in the Mobilization Regulations, and are not included in the personal equipment referred to in these tables.
3. The detachments of Military Police and of the Post Office Corps which form part of the Staffs of Army-Corps, Divisions, and Brigades, will join their Staff units at the places of concentration, and not at the places of mobilization, of the latter.

APPENDIX E—*continued.*

CAVALRY.

Detail.	Station and Place of Mobilization where Personal and First Regimental Equipment is kept.	Place where Second Regimental Equipment is kept.	Centre from which horses will be drawn.	
1ST BRIGADE.				
<i>Brigade Staff</i>	} London.	} Hounslow.	}	
1 Household Cavalry Regt. ..				Windsor.
1 Household Cavalry Regt. ..				Hounslow.
1 Cavalry Regt. with Machine-gun Section.				
1 Battery, Royal Horse Artillery.	Aldershot.	Aldershot.		
<i>No. 1 Ammunition Column</i> ..	Aldershot.	Aldershot.		
<i>2 Cos. Mounted Infantry with Machine-gun Section.</i>	Aldershot.	Aldershot (S).		
1 Co. Army Service Corps ..	London.	Hounslow.		
5th London Co., Vol. Med. Staff Corps.	London.	Hounslow.		
$\frac{1}{2}$ No. 11 Field Hospital (Eastern Dist.).	Warley.	Warley.		
2ND BRIGADE.				
<i>Brigade Staff</i>	} Aldershot.	} Aldershot (S).	}	
1 Cavalry Regt.				
1 Cavalry Regt.				
1 Cavalry Regt. with Machine-gun Section.				
1 Battery, Royal Horse Artillery.	Aldershot.	Aldershot.		
<i>No. 2 Ammunition Column</i> ..	Aldershot.	Aldershot.		
Mounted Detachment Royal Engineers.	} Aldershot.	} Aldershot (S).		
<i>2 Cos. Mounted Infantry</i> ..				
<i>Mounted Infantry Machine-gun Section.</i>	Aldershot.	Aldershot.		
1 Co. Army Service Corps ..	Aldershot.	Aldershot (S).		
1st Edinburgh Co., Vol. Med. Staff Corps.	Edinburgh.	} Aldershot.		
$\frac{1}{2}$ No. 2 Field Hospital (Western Dist.).	Plymouth.			

(S) This equipment is at present at Southampton, and is included in the embarkation stores kept there for a foreign expedition.

APPENDIX E—*continued.*CAVALRY—*continued.*

Detail.	Station and Place of Mobilization where Personal and First Regimental Equip-ment is kept.	Place where Second Regimental Equipment is kept.	Centre from which horses will be drawn.
3RD BRIGADE.			
<i>Brigade Staff</i>	} Dublin.	} Dublin.	} Dublin.
1 Cavalry Regt.			
1 Cavalry Regt. (1) ..	} Curragh.		
1 Cavalry Regt. with Machine-gun Section (2).			
1 Battery, Royal Horse Artillery.	Dublin.	Dublin.	
<i>No. 3 Ammunition Column</i> ..	Dublin.	Dublin.	
2 Cos. Mounted Infantry, with Machine-gun Section.	Curragh.	Dublin.	
1 Co. Army Service Corps ..	Dublin.	Dublin.	
1st Norwich Co., Vol. Med. Staff Ccrps.	Norwich.	Hounslow.	
$\frac{1}{2}$ No. 2 Field Hospital (Western Dist.).	Plymouth.	Aldershot.	
4TH BRIGADE.			
<i>Brigade Staff</i>	} York.	} Weedon.	} Weedon.
1 Cavalry Regt.			
1 Cavalry Regt.	Leeds.		
1 Cavalry Regt. with Machine-gun Section.	Manchester (A).		
1 Battery, Royal Horse Artillery.	Dublin.	Dublin.	
<i>No. 4 Ammunition Column</i> ..	Weedon.	Weedon.	
2 Cos. Mounted Infantry ..	Aldershot.	Aldershot (S).	
<i>Mounted Infantry Machine-gun Section.</i>	Aldershot.	Aldershot.	
1 Co. Army Service Corps ..	Aldershot.	Weedon (S) ..	
1st Aberdeen Co., Vol. Med. Staff Corps.	Aberdeen.	Weedon.	
$\frac{1}{2}$ No. 11 Field Hospital (Eastern Dist.).	Warley.	Warley.	

(1) Temporarily quartered at Dundalk.

(2) Temporarily quartered at Newbridge.

(A) These stores are kept at Weedon temporarily.

(S) This equipment is at present at Southampton, and is included in the embarkation stores kept there for a foreign expedition.

APPENDIX E—*continued.*

1st ARMY-CORPS.

1st DIVISION.

Detail.	Station and Place of Mobilization where Personal and First Regimental Equipment is kept.	Place where Second Regimental Equipment is kept.	Centre from which horses will be drawn.			
<i>Divisional Staff</i>	} London (B).	} West Croydon.	} Woolwich.			
1ST BRIGADE.						
<i>Brigade Staff</i>						
1 Battalion (Guards)						
1 Battalion (Guards)						
1 Battalion (Guards)						
1 Battalion with Machine-gun Section (Guards).						
1 Co. Army Service Corps ..	}	}	}			
<i>No. 1 Bearer Co. (Home Dist.)</i>						
2ND BRIGADE.						
<i>Brigade Staff</i>				} Devonport and Plymouth.	} West Croydon.	} Aldershot.
1 Battalion						
1 Battalion						
1 Battalion						
1 Battalion with Machine-gun Section.						
1 Co. Army Service Corps ..						
<i>No. 2 Bearer Co. (W. Dist.)</i> ..	Portland.	}	}			
	Devonport.					
DIVISIONAL TROOPS.						
No. 2 squadron, Cavalry Regt.	Brighton.			West Croydon.	} Woolwich.	
1 Field Batt., R.A.	} Woolwich.			} Woolwich.		
1 Field Batt., R.A.						
1 Field Batt., R.A.						
<i>No 5 Ammunition Column</i> ..	Caterham.	Caterham.	}			
1 (Field) Co., R.E.	Chatham.	Chatham.				
1 Co. Army Service Corps ..	Chatham.	West Croydon.				
<i>No. 1 Field Hospital (Home Dist.)</i> .	London.	London.				

(B) One battalion may be quartered at Windsor.

APPENDIX E—*continued.*1ST ARMY-CORPS—*continued.*

2ND DIVISION.

Detail.	Station and Place of Mobilization where Personal and First Regimental Equip- ment is kept.	Place where Second Regimental Equipment is kept.	Centre from which horses will be drawn.
<i>Divisional Staff</i>	}	}	}
3RD BRIGADE.			
<i>Brigade Staff</i>			
1 Battalion			
1 Battalion			
1 Battalion			
1 Battalion with Machine-gun Section.			
1 Co. Army Service Corps ..			
<i>No. 3 Bearer Co. (Aldershot)</i>			
4TH BRIGADE.			
<i>Brigade Staff</i>	}	}	}
1 Battalion			
1 Battalion			
1 Battalion			
1 Battalion with Machine-gun Section.			
1 Co. Army Service Corps ..			
<i>No. 4 Bearer Co. (Aldershot)</i>			
DIVISIONAL TROOPS.			
No. 3 Squadron, Cavalry Regt.	Brighton.	West Croydon.	Woolwich.
1 Field Batt., R.A.	}	Aldershot.	}
1 Field Batt., R.A.			
1 Field Batt., R.A.			
<i>No. 6 Ammunition Column</i> ..	Aldershot.	Aldershot.	
1 (Field) Co., R.E.	Aldershot.	}	
1 Co. Army Service Corps ..	Aldershot.		
<i>No. 6 Field Hospital (N.B. Dist.).</i>	Aldershot.		

(S) This equipment is at present at Southampton, and is included in the embarkation stores kept there for a foreign expedition.

APPENDIX E—*continued.*1ST ARMY-CORPS—*continued.*

3RD DIVISION.

Detail.	Station and Place of Mobilization where Personal and First Regimental Equip- ment is kept.	Place where Second Regimental Equipment is kept.	Centre from which horses will be drawn.		
<i>Divisional Staff</i>	} Dublin. } Curragh. Dublin.	} West Croydon.	} Dublin.		
5TH BRIGADE.					
<i>Brigade Staff</i>					
1 Battalion					
1 Battalion					
1 Battalion					
1 Battalion with Machine-gun Section.					
1 Co. Army Service Corps ..					
<i>No. 5 Bearer Co. (Dublin Dist.)</i>					
6TH BRIGADE.					
<i>Brigade Staff</i>	Cork.	}	}		
1 Battalion	} Fermoy (C).				
1 Battalion					
1 Battalion	} Cork.				
1 Battalion with Machine-gun Section.					
1 Co. Army Service Corps ..	Dublin.				
<i>No. 6 Bearer Co. (Cork Dist.)</i>	Cork.				
DIVISIONAL TROOPS.					
No. 4 Squadron, Cavalry Regt.	Brighton.			West Croydon.	Woolwich.
1 Field Batt., R.A. (1) ..	} Newbridge.			Newbridge.	}
1 Field Batt., R.A. (2) ..					
1 Field Batt., R.A. (3) ..					
<i>No. 7 Ammunition Column</i> ..	Caterham.	Caterham.	} Dublin.		
1 (Field) Co., R.E.	Curragh.	Curragh.			
1 Co. Army Service Corps ..	Curragh.	Aldershot.			
<i>No. 9 Field Hospital (Curragh)</i>	Curragh.	Curragh.			

(1) Temporarily quartered at Clonmel, battery station equipment at Queenstown.

(2) Temporarily quartered at Limerick, battery station equipment at Queenstown.

(3) Temporarily quartered at Fermoy.

(C) This equipment is kept at Cork temporarily.

APPENDIX E—*continued.*
1ST ARMY-CORPS—*continued.*

CORPS TROOPS.			
Detail.	Station and Place of Mobilization where Personal and First Regimental Equipment is kept.	Place where Second Regimental Equipment is kept.	Centre from which horses will be drawn.
<i>Corps Staff</i> Head-quarters and No. 1 Squadron, Cavalry Regt.	London. Brighton.	London. West Croydon.	} Woolwich.
CORPS ARTILLERY.			
<i>Staff</i> 1 Batt., R.H.A. 1 Batt., R.H.A. 1 Batt., R.H.A. (1) 1 Field Batt., R.A. 1 Field Batt., R.A. 1 Field Batt., R.A. <i>No. 8 Ammunition Column</i> ..	} Woolwich. London. } Hilsea. Christchurch. Caterham.	Woolwich. London. Hilsea. Christchurch. Caterham.	} Woolwich.
CORPS ENGINEERS.			
<i>Staff</i> “A ” Troop, Bridging Bn., R.E. Head-quarters and Sections 1 to 4, Telegraph Bn., R.E. 1 (Field) Co., R.E. No. 1 Field Park, R.E. Balloon Section, R.E. . . .	} Aldershot.	Aldershot (S).	} Aldershot.
CORPS INFANTRY.			
1 Battalion with Machine-gun Section.	Woolwich.	West Croydon.	Woolwich.
CORPS DETAILS.			
<i>No. 1 Co. Army Signallers</i> .. 1 Co. Army Service Corps ..	Aldershot. Aldershot.	Aldershot (S). West Croydon (S).	} Aldershot.

(1) Temporarily quartered at Woolwich.

(S) This equipment is at present at Southampton, and is included in the embarkation stores kept there for a foreign expedition.

APPENDIX E—*continued.*

IIInd ARMY-CORPS.

4TH DIVISION.

Detail.	Station and Place of Mobilization where Personal and First Regimental Equip- ment is kept.	Place where Second Regimental Equipment is kept.	Centre from which horses will be drawn.
<i>Divisional Staff</i>	Dublin.	}	}
7TH BRIGADE.			
<i>Brigade Staff</i>	Dublin.		
1 Battalion	Mullingar.		
1 Battalion	} Dublin.		
1 Battalion			
1 Battalion with Machine-gun Section.			
1 Co. Army Service Corps ..	Dublin.		
1st London Co., Vol. Med. Staff Corps.	London.		
8TH BRIGADE.			
<i>Brigade Staff</i>	} Belfast.		
1 Battalion			
1 Battalion			
1 Battalion	Newry.		
1 Battalion with Machine-gun Section.	Enniskillen.		
1 Co. Army Service Corps ..	Curragh.		
2nd London Co., Vol. Med. Staff Corps.	London.		
DIVISIONAL TROOPS.			
No. 2 Squadron, Cavalry Regt.	Colchester.	Colchester.	}
1 Field Batt., R.A.	} Weedon.	Weedon.	
1 Field Batt., R.A.			
1 Field Batt., R.A.			
No. 9 Ammunition Column ..	Warley.	Warley.	
1 (Field) Co., R.E.	Curragh.	Curragh.	
1 Co. Army Service Corps ..	Woolwich.	Warley.	
No. 7 Field Hospital (Dublin Dist.).	Dublin.	Dublin.	

APPENDIX E—*continued.*IND ARMY-CORPS—*continued.*

5TH DIVISION.

Detail.	Station and Place of Mobilization where Personal and First Regimental Equip- ment is kept.	Place where Second Regimental Equipment is kept.	Centre from which horses will be drawn.	
<i>Divisional Staff</i>	Colchester.	Tilbury.	Woolwich.	
9TH BRIGADE.				
<i>Brigade Staff</i>	Portsmouth.	} Tilbury.	} Aldershot.	
1 Battalion	(D).			
1 Battalion (Anglesey Barracks)	} Portsmouth.			
1 Battalion (Gosport).. ..				
1 Battalion with Machine-gun Section.	Aldershot.			
1 Co. Army Service Corps ..	Portsmouth.	}	}	
<i>No. 9 Bearer Co. (Woolwich)</i>	Woolwich.			
10TH BRIGADE.				
<i>Brigade Staff</i>	} Birr.	} Tilbury.	} Dublin.	
1 Battalion				
1 Battalion	Kilkenny.			
1 Battalion	Kinsale (E).			
1 Battalion with Machine-gun Section.	Tipperary.			
1 Co. Army Service Corps ..	Aldershot.	}	}	
1st Woolwich Co., Vol. Med. Staff Corps.	Woolwich.			
DIVISIONAL TROOPS.				
No. 3 Squadron, Cavalry Regt.	Colchester.	Colchester.	} Weedon.	
1 Field Batt., R.A.	} Newcastle.	Newcastle.		
1 Field Batt., R.A.				
1 Field Batt., R.A.				
<i>No. 10 Ammunition Column</i> ..	Tilbury.	Tilbury.		
1 (Field) Co., R.E.	Aldershot.	Aldershot.	}	
1 Co. Army Service Corps ..	Curragh.	Tilbury.		
<i>No. 8 Field Hospital (Cork Dist.).</i>	Cork.	Cork.		

(D) The station to provide this battalion is not yet settled; Second Regimental Outfit to be at Tilbury.

(E) Personal and First Regimental Equipment is kept at Cork temporarily.

APPENDIX E—*continued.*
 IIND ARMY-CORPS—*continued.*

6TH DIVISION.

Detail.	Station and Place of Mobilization where Personal and First Regimental Equip- ment is kept.	Place where Second Regimental Equipment is kept.	Centre from which horses will be drawn.
<i>Divisional Staff</i>			
11TH BRIGADE.			
<i>Brigade Staff</i>	} Colchester.	} Colchester.	} Woolwich.
1 Battalion			
1 Battalion			
1 Battalion			
1 Battalion with Machine-gun Section.	Warley.		
1 Co. Army Service Corps ..	Colchester.		
<i>No. 7 Bearer Co. (E. Dist.)</i> ..	Colchester.		
12TH BRIGADE.			
<i>Brigade Staff</i>	} York.	} Colchester.	} Weedon.
1 Battalion			
1 Battalion			
1 Battalion			
1 Battalion with Machine-gun Section.	Manchester.		
1 Co. Army Service Corps ..	Woolwich.		
1st Leeds Co., Vol. Med. Staff Corps.	Leeds.		
DIVISIONAL TROOPS.			
No. 4 Squadron, Cavalry Regt.	Colchester.	Colchester.	
1 Field Batt., R.A.	} Colchester.	} Colchester.	
1 Field Batt., R.A.			
1 Field Batt., R.A.			
<i>No. 11 Ammunition Column</i> ..	Colchester.	Colchester	
1 (Field) Co., R.E.	Aldershot.	Aldershot.	
1 Co. Army Service Corps ..	Woolwich.	Colchester.	
<i>No. 3 Field Hospital (Thames Dist.).</i>	Chatham.	Chatham.	

APPENDIX E—*continued.*
 IIND ARMY-CORPS—*continued.*

CORPS TROOPS.

Detail.	Station and Place of Mobilization where Personal and First Regimental Equip- ment is kept.	Place where Second Regimental Equipment is kept.	Centre from which horses will be drawn.	
<i>Corps Staff</i> Head-quarters and No. 1 Squadron, Cavalry Regt.	Colchester. Colchester.	} Colchester.	Weedon.	
CORPS ARTILLERY.				
<i>Staff</i> 1 Batt., R.H.A. 1 Batt., R.H.A. 1 Field Batt., R.A. 1 Field Batt., R.A. 1 Field Batt., R.A. <i>No 12 Ammunition Column</i> ..	Ipswich. Aldershot. Dorchester. } Ipswich. Glasgow. Warley.	Ipswich. Aldershot. Dorchester. Ipswich. Glasgow. Warley.	} Weedon.	
CORPS ENGINEERS.				
<i>Staff</i> "B" Troop, Bridging Bn., R.E. Sections 5 to 8, Telegraph Bn., R.E. 1 (Fortress) Co., R.E. (F). .. No. 2 Field Park, R.E. ..	} Aldershot. London. Aldershot.	Aldershot. London. Aldershot.		} Aldershot.
CORPS INFANTRY.				
1 Battalion with Machine-gun Section.	Preston.	Warley.		Weedon.
CORPS DETAILS.				
<i>No. 2 Co. Army Signallers</i> .. 1 Co. Army Service Corps ..	Warley. Dublin.	} Warley.	Weedon.	

(F) As a Field Company.

APPENDIX E—*continued.*

IIIrd ARMY-CORPS.

7TH DIVISION.

Detail.	Station and Place of Mobilization where Personal and First Regimental Equipment is kept.	Place where Second Regimental Equipment is kept.	Centre from which horses will be drawn.
<i>Divisional Staff</i>	Chatham.		
13TH BRIGADE.			
<i>Brigade Staff</i>			
3rd Bn. Royal Fusiliers ..			
4th Bn. Royal Fus. (Finsbury)			
5th Bn. Royal Fusiliers ..	Hounslow.		
3rd Bn. Middlesex Regt. ..			
4th Bn. Middlesex Regt., with Machine-gun Section.			
1 Co. Army Service Corps ..	Woolwich.	Chatham.	
3rd London Co., Vol. Med. Staff Corps.	London.		
14TH BRIGADE.			
<i>Brigade Staff</i>	London.		
3rd Bn. East Surrey Regt. ..	Kingston.		
4th Bn. East Surrey Regt. ..	Kingston.		
7th Bn. King's Rl. Rifle Corps	Barnet.		
5th Bn. Rifle Brigade.. ..	London.		
7th Bn. Rifle Brigade, with Machine-gun Section.	Dalston (T).		
1 Co. Army Service Corps ..	Aldershot.	Chatham (S).	
4th London Co., Vol. Med. Staff Corps.	London.	Chatham.	
DIVISIONAL TROOPS.			
No. 2 Squadron, Cavalry Regt.	Shorncliffe (H).	Shorncliffe.	
1 Field Batt., R.A.			
1 Field Batt., R.A.	Exeter.	Exeter.	
1 Field Batt., R.A.	Trowbridge.	Trowbridge.	
No 13 Ammunition Column ..	Chatham.		
1 (Fortress) Co., R.E. (G) ..	Chatham.	Chatham.	
1 Co. Army Service Corps ..	Devonport.		
No 13 Field Hospital (N.W. Dist.).	Aldershot.	Aldershot (S).	

(G) As a Field Company.

(H) Small-arms at Dover.

(S) This equipment is at present at Southampton, and is included in the embarkation stores kept there for a foreign expedition.

(T) Equipment is kept at the Tower.

APPENDIX E—*continued.*IIIrd ARMY-CORPS—*continued.*

8TH DIVISION.						
Detail.	Station and Place of Mobilization where Personal and First Regimental Equip-ment is kept.	Place where Second Regimental Equipment is kept.	Centre from which horses will be drawn.			
<i>Divisional Staff</i>	Chatham.	Chatham.	Woolwich.			
15TH BRIGADE.						
<i>Brigade Staff</i>	York.	} Chatham.	} Weedon.			
3rd Bn. West Yorkshire Regt.	York.					
4th Bn. West Yorkshire Regt.	York.					
3rd Bn. West Riding Regt. ..	Halifax.					
3rd Bn. Yorkshire L.I. ..	Pontefract.					
3rd Bn. York and Lancaster Regt., with Machine-gun Section.	Pontefract ..					
1 Co. Army Service Corps ..	Aldershot ..	Chatham (S).				
<i>No. 10 Bearer Co. (S. Dist.)</i>	Portsmouth ..	Chatham.				
16TH BRIGADE.						
<i>Brigade Staff</i>	Preston ..	} Chatham.				
3rd & 4th Bns. Royal Lancaster Regt.	Lancaster ..					
3rd & 4th Bns. Lancashire Fus.	Bury ..					
3rd Bn. East Lancashire Regt.	Burnley..					
3rd & 4th Bns. Loyal North Lancashire Regt., with Machine-gun Section.	Preston ..					
1 Co. Army Service Corps ..	Aldershot ..	Chatham (S).				
1st Manchester Co., Vol. Med. Staff Corps.	Manchester ..	Chatham.				
DIVISIONAL TROOPS.						
No. 3 Squadron, Cavalry Regt.	Shorncliffe (H).	Shorncliffe.	Woolwich.			
1 Field Batt., R.A.	} Aldershot.	} Chatham.	} Aldershot.			
1 Field Batt., R.A.						
1 Field Batt., R.A.						
<i>No. 14 Ammunition Column</i> ..	Chatham.	} Chatham.				
1 (Fortress) Co., R.E. (G) ..	Chatham.					
1 Co. Army Service Corps ..	Portsmouth.					
<i>No. 12 Field Hospital (N.W. Dist.).</i>	Aldershot.	Aldershot (S).				

(G) As a Field Company.

(H) Small-arms at Dover.

(S) This equipment is at present at Southampton, and is included in the embarkation stores kept there for a foreign expedition.

APPENDIX E—*continued.*IIIrd ARMY-CORPS—*continued.*

9TH DIVISION.

Detail.	Station and Place of Mobilization where Personal and First Regimental Equip- ment is kept.	Place where Second Regimental Equipment is kept.	Centre from which horses will be drawn.
<i>Divisional Staff</i>	Dover.	Dover.	}
17TH BRIGADE.			
<i>Brigade Staff</i>	} Dover.	Dover.	
1 Battalion			
1 Battalion			
1 Battalion	} Shorncliffe (H).	Shorncliffe.	
1 Battalion, with Machine-gun Section (1).			
1 Co. Army Service Corps ..	Shorncliffe (J).	Shorncliffe (J).	
<i>No. 8 Bearer Co. (S.E. Dist.)</i>	Aldershot.	Dover (S).	
18TH BRIGADE.			
<i>Brigade Staff</i>	Maidstone.	}	
3rd Bn. Royal West Surrey Regt.	Guildford.		
3rd Bn. Royal Sussex Regt. ..	Chichester.		
3rd Bn. Royal Berkshire Regt.	Reading.		
3rd & 4th Bns. Royal West Kent Regt., with Machine- gun Section.	Maidstone.		
1 Co. Army Service Corps ..	Woolwich.		
1st Maidstone Co., Vol. Med. Staff Corps.	Maidstone.		
DIVISIONAL TROOPS.			
No. 4 squadron, Cavalry Regt.	Shorncliffe (H).	Shorncliffe.	Woolwich.
1 Field Batt., R.A.	} Shorncliffe.	Shorncliffe.	}
1 Field Batt., R.A.			
1 Field Batt., R.A.			
<i>No. 15 Ammunition Column</i> ..	Chatham.	Chatham.	
1 (Field) Co., R.E.	Shorncliffe (H).	Shorncliffe.	
1 Co. Army Service Corps ..	Shorncliffe (J).	Shorncliffe (J).	
<i>No. 10 Field Hospital (N.E. Dist.).</i>	Aldershot.	Aldershot (S).	

(1) Temporarily quartered at Aldershot.

(H) Small-arms at Dover.

(J) Small-arms and vehicles at Dover.

(S) This equipment is at present at Southampton, and is included in the embarkation stores kept there for a foreign expedition.

APPENDIX E—*continued.*IIIrd ARMY-CORPS—*continued.*

CORPS TROOPS.

Detail.	Station and Place of Mobilization where Personal and First Regimental Equipment is kept.	Place where Second Regimental Equipment is kept.	Centre from which horses will be drawn.	
<i>Corps Staff</i> Head - quarters and No. 1 Squadron, Cavalry Regt.	Maidstone. Shorncliffe (H).	Maidstone. Shorncliffe.	} Woolwich.	
CORPS ARTILLERY.				
<i>Staff</i> 1 Field Batt., R.A. 1 Field Batt., R.A. 1 Field Batt., R.A. <i>No. 16 Ammunition Column</i> ..	} Sheffield. Longford. Chatham.	Sheffield. Longford. Chatham.	} Woolwich.	
CORPS ENGINEERS.				
1st London Volunteer Engineers (Field Company).		London.		London.
CORPS INFANTRY.				
4th Bn. Derbyshire Regt., with Machine-gun Section.	Newark.	Maidstone.	Weedon.	
CORPS DETAILS.				
<i>No. 3 Co. Army Signallers</i> .. 1 Co. Army Service Corps ..	Maidstone. Woolwich.	} Maidstone.	Woolwich.	

(H) Small-arms at Dover.

APPENDIX F.

LIST OF REGULAR UNITS ALLOTTED TO GARRISONS.

Unit.	Station.	District to which allotted.	Remarks.
Fortress Co., R.E.	.. Cork	Cork	
.. ..	.. Portsmouth ..	Southern ..	
Railway Co., R.E.	.. Chatham ..	} Thames. ..	
.. ..	.. Woolwich ..		
Survey Co., R.E.	.. Bedford.. ..	Eastern. ..	
.. ..	.. Clifton	Western. ..	
.. ..	.. Dublin	Ireland	
.. ..	.. Southampton ..	Southern ..	
Infantry Bn. (Guards)	.. Dublin (T) ..	Dublin	
Infantry Battalion	.. Buttevant ..	Cork	
.. ..	.. Chatham ..	Thames ..	
.. ..	.. Dover	South-Eastern ..	
.. ..	.. Guernsey ..	Guernsey ..	
.. ..	.. Jersey	Jersey	
.. ..	.. Parkhurst ..	Southern ..	
.. ..	.. Plymouth ..	Western ..	
.. ..	.. Portsmouth ..	} Southern ..	
.. ..	.. Portsmouth ..		

NOTE.—The Royal Artillery (Garrison) and Submarine Mining Companies, R.E., are not shown in this table, as they are allotted to the Districts where they are quartered, as shown in detail in Appendix H.

(T) Personal equipment is kept at the Tower.

APPENDIX G.

LIST OF UNALLOTTED REGULAR UNITS, SHOWING WHERE THEIR MOBILIZATION STORES ARE KEPT.

Unit.	Station and Place of Mobilization where Personal Equipment is kept.				Centre from which horses will be drawn.
Cavalry Regiment	Ballincollig				} Dublin.
„ „	Dublin				
„ „	Dundalk (C)				
„ „	Edinburgh				Weedon.
Household Cavalry Regiment ..	London				Woolwich.
Cavalry Regiment	Norwich				Weedon.
Field Battery	} Athlone				} Dublin.
Field Battery					
Infantry Battalion	Athlone				
„ „	Curragh				
„ „	Edinburgh				
„ „	Galway				
„ „	Glasgow				
„ „	Limerick				
„ „ (Guards)	London (T)				
„ „	Pembroke Dock				
„ „ (Guards)	Windsor* (T)				

NOTES.—The Field Batteries are in possession of their full war equipment.

For the Cavalry Regiments, saddlery for riding-horses up to War Establishment is kept in addition to personal equipment.

The Dépôt Batteries of Field and Mountain Artillery are unallotted, and mobilization stores are not provided for them.

(C) Temporarily at Cahir.

(T) Personal equipment at the Tower.

* Or 1st Brigade. Engine

**LIST OF REGULAR UNITS SERVING AT HOME, SHOWING THE ALLOTMENT OF EACH
UNIT ON MOBILIZATION.**

CAVALRY.

Regiment.	Station.	How allotted on Mobilization.	Place of Mobilization where Personal and First Regimental Equipment is kept.	Place where Second Regimental Equipment is kept.
	Aldershot ..	2nd Cavalry Brigade ..	Aldershot ..	Aldershot (S).
	Aldershot ..	2nd Cavalry Brigade ..	Aldershot ..	Aldershot (S).
	Aldershot ..	2nd Cavalry Brigade ..	Aldershot ..	Aldershot (S).
	Ballincollig ..	Unallotted ..	Ballincollig ..	..
	Brighton ..	I. Army-Corps Regt. ..	Brighton ..	West Croydon.
	Colchester..	II. Army-Corps Regt... ..	Colchester ..	Colchester.
	Curragh (3)	3rd Cavalry Brigade ..	Curragh ..	Dublin.
	Curragh (4)	3rd Cavalry Brigade ..	Curragh ..	Dublin.
	Dublin ..	3rd Cavalry Brigade ..	Dublin ..	Dublin.
	Dublin ..	Unallotted ..	Dublin ..	..

(S) This equipment is at present at Southampton, and is included in the embarkation stores kept there for a foreign expedition. (3) Temporarily quartered at Newbridge. (4) Temporarily quartered at Dundalk.

APPENDIX ³H—*continued*.
CAVALRY—*continued*.

Regiment.	Station.	How allotted on Mobilization.	Place of Mobilization where Personal and First Regimental Equipment is kept.	Place where Second Regimental Equipment is kept.
	Dundalk (5)	Unallotted	Dundalk	..
	Edinburgh	Unallotted	Edinburgh	..
	Hounslow ..	1st Cavalry Brigade	Hounslow	..
	Leeds ..	4th Cavalry Brigade	Leeds ..	..
	London (Household).	1st Cavalry Brigade	London ..	..
	London (Household).	Unallotted	London ..	..
	Manchester	4th Cavalry Brigade	Manchester (1)	..
	Norwich ..	Unallotted	Norwich	..
	Shorncliffe, ..	III. Army-Corps Regt..	Shorncliffe (2) ..	..
	Windsor (Household).	1st Cavalry Brigade	Windsor	..
	York ..	4th Cavalry Brigade	York ..	..

(1) Temporarily kept at Weedon. (2) Small-arms at Dover. (5) Temporarily quartered at Cahir.
NOTE.—The stations named in the above table are in anticipation of the completion of the Barrack Scheme.

ROYAL ARTILLERY—HORSE, FIELD AND MOUNTAIN.

N.B.—The complete War Equipment of each Battery is in charge of the Commanding Officer except in special cases where the Battery Station Equipment is in Ordnance Store charge.

Battery.	Station and Place of Mobilization.	How allotted on Mobilization.	Remarks.
	Aldershot (R.H.A.)..	1st Cavalry Brigade	..
	Aldershot (R.H.A.)..	2nd Cavalry Brigade	..
	Aldershot (R.H.A.)..	II. Army-Corps	..
	Aldershot ..	2nd Division..	..
	Aldershot ..	2nd Division..	..
	Aldershot ..	2nd Division..	..
	Aldershot ..	8th Division..	..
	Aldershot ..	8th Division..	..
	Aldershot ..	8th Division..	..
	Athlone ..	Unallotted ..	..
	Athlone ..	Unallotted ..	..
	Christchurch ..	I. Army-Corps	..
	Colchester ..	6th Division..	..
	Colchester ..	6th Division ..	..
	Colchester ..	6th Division..	..
	Coventry ..	4th Division ..	..
	Dorchester (R.H.A.)	II. Army-Corps	..
	Exeter ..	7th Division..	..
	Exeter ..	7th Division..	..
	Glasgow ..	II. Army-Corps	..
	Hilsea ..	I. Army-Corps	..
	Hilsea ..	I. Army-Corps	..
	Ipswich ..	II. Army-Corps	..
	Ipswich ..	II. Army-Corps	..

APPENDIX H—continued.

ROYAL ARTILLERY—HORSE AND FIELD AND MOUNTAIN—continued.

Battery.	Station and Place of Mobilization.	How allotted on Mobilization.	Remarks.
	London (R.H.A.) ..	I. Army-Corps ..	<i>Temporarily at Woolwich.</i>
	Longford ..	III. Army-Corps ..	..
	Newbridge (R.H.A.) ..	3rd Cavalry Brigade ..	..
	Newbridge (R.H.A.) ..	4th Cavalry Brigade ..	..
	Newbridge ..	3rd Division.. ..	..
	Newbridge ..	3rd Division.. ..	..
	Newbridge ..	3rd Division.. ..	..
	Newcastle ..	5th Division.. ..	..
	Newcastle ..	5th Division.. ..	..
	Newcastle ..	5th Division.. ..	..
	Newport (Mountain Depot). ..	Unallotted. ..	..
	Sheffield ..	III. Army-Corps ..	..
	Sheffield ..	III. Army-Corps ..	..
	Shorncliffe ..	9th Division.. ..	..
	Shorncliffe ..	9th Division.. ..	..
	Shorncliffe ..	9th Division.. ..	..
	Trowbridge ..	7th Division.. ..	..
	Weedon ..	4th Division.. ..	..
	Weedon ..	4th Division.. ..	..
	Woolwich (R.H.A.) ..	I. Army-Corps ..	..
	Woolwich (R.H.A.) ..	I. Army-Corps ..	..
	Woolwich ..	1st Division ..	..
	Woolwich ..	1st Division ..	..
	Woolwich ..	1st Division ..	..
	Woolwich (Depôt, 4 batts.) ..	Unallotted ..	..

Horse Artillery are distinguished from Field Batteries by the letters (R.H.A.).

ROYAL ARTILLERY—GARRISON.

Unit.	Stations of Units.	District to which detailed on Mobilization.	Unit.	Stations of Units.	District to which detailed on Mobilization.
G Dover	South-Eastern District.		M Portsmouth ..	Southern District.
G Dover			M Portsmouth ..	
Dover (Depôt)			M Portsmouth ..	
South - Eastern District Establishment.				Portsmouth ..	
M Sheerness	Thames District.		Portsmouth ..	
M Sheerness			Golden Hill, I.W.	
G Shoeburyness			Golden Hill, I.W.	
Shoeburyness			Fort Rowner (Depôt)	
Woolwich (Sub-Depôt)	Eastern District.		M Weymouth ..	
Thames District Establishment.				Southern District Establishment.	
Landguard Fort				
Eastern District Establishment.					
Yarmouth (Sub-Depôt)				

APPENDIX H—continued.
ROYAL ARTILLERY—GARRISON—continued.

Unit.	Stations of Units.	District to which detailed on Mobilization.	Unit.	Stations of Units.	District to which detailed on Mobilization.
M Devonport	Western District.	GM Cork Harbour	Ireland.
M Devonport		M Cork Harbour .. ..	.. ..
Devonport		Templemore (Sub-Depôt)		
Devonport (Depôt)		District Establishment in Ireland.		
Pembroke Dock		Sunderland (Sub-Depôt)		North-Eastern District.
Western District Establishment.		North - Eastern District Establishment.		
Jersey	Channel Islands.	Leith (Sub-Depôt)	North British District.
Guernsey		North British District Establishment.		
Channel Islands District Establishment.		Seaforth (Sub-Depôt)	North-Western District.
			North - Western District Establishment.		

Threc Officers and 252 non-commissioned officers and men are to be detailed from the companies marked **G**, and 664 non-commissioned officers and men from the companies marked **M**, as reinforcements, in anticipation of war, for the garrisons of Gibraltar and Malta respectively. These details will take with them their arms and accoutrements; the companies will be brought up to establishment by Reservists, for whom arms and accoutrements are kept in Ordnance Store charge at the stations occupied by the companies. A further supply of arms and accoutrements for any Reservists surplus to the establishment is kept in Ordnance Store charge at the head-quarters of the Garrison Artillery Divisions.

ROYAL ENGINEERS.

MOBILIZATION FOR HOME DEFENCE.

1287

Letter or No.	Unit.	Station.	How allotted on Mobilization.	Place of Mobilization where Personal and First Regimental Equipment is kept.	Place where Second Regimental Equipment is kept.
	Bridging Troop ..	Aldershot	I. Army-Corps	Aldershot	Aldershot (S).
	" " ..	Aldershot	II. Army-Corps	Aldershot	Aldershot.
	Telegraph Division ..	Aldershot	I. Army-Corps	Aldershot	Aldershot (S).
	" " ..	London	II. Army-Corps	Aldershot	Aldershot.
	Field Park ..	Aldershot	I. Army-Corps	Aldershot	Aldershot (S).
	" " ..	Aldershot	II. Army-Corps	Aldershot	Aldershot.
	Mounted Detachment	Aldershot	2nd Cavalry Brigade.	Aldershot	Aldershot (S).
	Field Company ..	Aldershot	2nd Division..	Aldershot	Aldershot (S).
	" " ..	Aldershot	I. Army-Corps	Aldershot	Aldershot (S).
	" " ..	Aldershot	5th Division ..	Aldershot	Aldershot.
	" " ..	Aldershot	6th Division ..	Aldershot	Aldershot.
	" " ..	Chatham	1st Division ..	Chatham	Chatham.
	" " ..	Shorncliffe	9th Division ..	Shorncliffe (H)	Shorncliffe.
	" " ..	Curragh	3rd Division ..	Curragh	Curragh.
	" " ..	Curragh	4th Division ..	Curragh	Curragh.
	" " ..	London	II. Army-Corps*	London	London.
	Fortress Company ..	Chatham	7th Division*	Chatham	Chatham.
	" " ..	Chatham	8th Division*	Chatham	Chatham.
	" " ..	Cork ..	Cork ..	Chatham	Chatham.
	" " ..	Portsmouth ..	Southern District		
	" " ..	Chatham ..	Thames District		
	Railway Company ..				

* As Field Companies.

(S) This equipment is at present at Southampton, and is included in the embarkation stores kept there for a foreign expedition.

(H) Small-arms at Dover.

APPENDIX H—continued.
ROYAL ENGINEERS—continued.

Letter or No.	Unit.	Station.	How allotted on Mobilization.	Place of Mobilization where Personal and First Regimental Equipment is kept.	Place where Second Regimental Equipment is kept.
	Railway Company ..	Woolwich ..	Thames District ..		
	Survey Company ..	Bedford ..	Eastern District ..		
	" ..	Clifton ..	Western District ..		
	" ..	Dublin ..	Ireland ..		
	" ..	Southampton ..	Southern District ..		
	Submarine Mining Company.	Gosport ..	Southern District ..		
	" ..	Isle of Wight ..	Eastern District ..		
	" ..	Harwich ..	Thames District ..		
	" ..	Gravesend ..			
	" ..	Sheerness ..			
	" ..	Chatham "M" ..			
	" ..	Company, Depôt.			
	" ..	Plymouth ..	Western District ..		
	" ..	Pembroke Dock ..			
	" ..	Cork ..	Cork ..	Aldershot ..	Aldershot (S).
	Balloon Section ..	Aldershot ..	I. Army-Corps ..		

The detachments of the Coast Battalion, Royal Engineers, form part of the garrisons of the places where they are located in peace.
(S) This equipment is at present at Southampton, and is included in the embarkation stores kept there for a foreign expedition.

INFANTRY.

Battalion.	Station.	How allotted on Mobilization.	Place of Mobilization where Personal and First Regimental Equipment is kept.	Place where Second Regimental Equipment is kept.
	Aldershot	..		
	Aldershot	..	Aldershot	Aldershot (S).
	Aldershot	..		
	Aldershot	..		
	Aldershot	..		
	Aldershot	..	Aldershot	Aldershot (S).
	Aldershot	..		
	Aldershot	..		
	Aldershot	..	Aldershot	
	Athlone	..	Athlone	Tilbury.
	Belfast	..		
	Belfast	..	Belfast..	Warley.
	Birr ..	..	Birr ..	Tilbury.
	Bradford	..	Bradford	Colchester.
	Buttevant	..	Buttevant	
	Chatham	..	Chatham	
	Colchester	..		
	Colchester	..	Colchester	Colchester.
	Colchester	..		
	Cork ..	..	
	Cork ..	..	Cork ..	West Croydon.
	Curragh	..		
	Curragh	..	Curragh	West Croydon.
	Curragh	..	Curragh	
	Devonport	..	..
		..	See Plymouth..	

(S) This equipment is at present at Southampton, and is included in the embarkation stores kept there for a foreign expedition.

INFANTRY—continued.

MOBILIZATION FOR HOME DEFENCE.

1291

Battalion.	Station.	How allotted on Mobilization.	Place of Mobilization where Personal and First Regimental Equipment is kept.	Place where Second Regimental Equipment is kept.
	Manchester ..	12th Brigade ..	Manchester ..	Colchester.
	Mullingar ..	7th Brigade ..	Mullingar ..	Warley.
	Newry ..	8th Brigade ..	Newry ..	Warley.
	Parkhurst ..	Southern District	Portsmouth ..	
	Pembroke Dock	Unallotted ..	..
	Plymouth ..	} 2nd Brigade ..	Plymouth ..	West Croydon.
	Plymouth ..			
	Plymouth ..	Western District	Plymouth ..	
	Plymouth ..	2nd Brigade ..	Portland ..	West Croydon.
	Portland ..	} 9th Brigade ..	Portsmouth ..	Tilbury.
	Portsmouth(Anglesea)			
	Portsmouth(Gosport)	} Southern District	Portsmouth ..	
	Portsmouth ..			
	Portsmouth ..	II. Army-Corps	Preston ..	Warley.
	Preston ..	12th Brigade ..	Sheffield ..	Colchester.
	Sheffield ..	} 17th Brigade ..	Shorncliffe (H)	Shorncliffe
	Shorncliffe ..			
	Shorncliffe ..	10th Brigade ..	Tipperary ..	Tilbury.
	Tipperary ..	11th Brigade ..	Warley ..	Colchester.
	Warley ..	Unallotted* ..	London ..	
	Windsor (Guards)	I. Army-Corps	Woolwich ..	West Croydon.
	Woolwich ..	12th Brigade ..	York ..	Colchester.
	York ..			

* Or 1st Brigade.

(H) Small-arms at Dover.

The remaining battalions in the Field Army are found by Militia, and they are therefore not included in this Table, which appliesto Regulars only.

APPENDIX H—*continued*.
ARMY SERVICE CORPS.

Company.	Station.	How allotted on Mobilization.	Place of Mobilization where Personal and First Regimental Equipment is kept.	Place where Second Regimental Equipment is kept.
	Aldershot	3rd Brigade	Aldershot	Aldershot (S).
	Aldershot	4th Brigade	Aldershot	Aldershot (S).
	Aldershot	2nd Division	Aldershot	Aldershot (S).
	Aldershot	I. Army-Corps	Aldershot	West Croydon (S).
	Aldershot	14th Brigade	Aldershot	Chatham (S).
	Aldershot	15th Brigade	Aldershot	Chatham (S).
	Aldershot	16th Brigade	Aldershot	Chatham (S).
	Aldershot	2nd Cavalry Brigade	Aldershot	Aldershot (S).
	Aldershot	4th Cavalry Brigade	Aldershot	Weedon (S).
	Aldershot	10th Brigade	Aldershot	Tilbury.
	Chatham	1st Division	Chatham	West Croydon.
	Colchester	11th Brigade	Colchester.	Colchester.
	Curragh	5th Brigade	Curragh	West Croydon.
	Curragh	3rd Division	Curragh	Aldershot.
	Curragh	8th Brigade	Curragh	Warley.
	Curragh	5th Division	Curragh	Tilbury.
	Devonport	2nd Brigade	Devonport	West Croydon.
	Devonport	7th Division	Devonport	Chatham.
	Dublin	6th Brigade	Dublin	West Croydon.
	Dublin	7th Brigade	Dublin	Warley.
	Dublin	II. Army-Corps	Dublin	Warley.
	Dublin	3rd Cavalry Brigade	Dublin	Dublin.

(S) This equipment is at present at Southampton, and is included in the embarkation stores kept there for a foreign expedition.

ARMY SERVICE CORPS—continued.

MOBILIZATION FOR HOME DEFENCE.

1293

Company.	Station.	How allotted on Mobilization.	Place of Mobilization where Personal and First Regimental Equipment is kept.	Place where Second Regimental Equipment is kept.
	London	1st Brigade	London	West Croydon.
	London	1st Cavalry Brigade	London	Hounslow.
	Portsmouth	9th Brigade	Portsmouth	Tilbury.
	Portsmouth	8th Division	Portsmouth	Chatham.
	Shorncliffe	17th Brigade	Shorncliffe (J)	Shorncliffe (J).
	Shorncliffe	9th Division	Shorncliffe (J)	Shorncliffe (J).
	Woolwich	4th Division	Woolwich	Warley.
	Woolwich	12th Brigade	Woolwich	Colchester.
	Woolwich	6th Division	Woolwich	Colchester.
	Woolwich	13th Brigade	Woolwich	Chatham.
	Woolwich	18th Brigade	Woolwich	Maidstone.
	Woolwich	III. Army-Corps	Woolwich	Maidstone.

(J) Small-arms and vehicles at Dover.

APPENDIX J.

LIST OF REGULAR BEARER COMPANIES AND FIELD HOSPITALS IN THE FIELD ARMY,
SHOWING THE COMPANIES OF MEDICAL STAFF CORPS FROM WHICH EACH IS
FORMED.

Unit.	Company from which the Unit is formed.	How allotted on Mobilization.	Place of Mobiliza- tion where First Regi- mental Equipment is kept.	Place where Second Regi- mental Equip- ment is kept.
No. 1 Bearer Company	18th (Home District) ..	1st Brigade..	London ..	West Croydon.
" 2 "	7th (Western District) ..	2nd Brigade	Devonport	West Croydon.
" 3 "	1st (Aldershot) ..	3rd Brigade	Aldershot ..	Aldershot (S).
" 4 "	2nd (Aldershot) ..	4th Brigade	Aldershot ..	Aldershot (S).
" 5 "	14th (Dublin District) ..	5th Brigade	Dublin ..	West Croydon.
" 6 "	16th (Cork District) ..	6th Brigade	Cork ..	West Croydon.
" 7 "	9th (Eastern District) ..	11th Brigade	Colchester..	Colchester.
" 8 "	11th (South-Eastern District)	17th Brigade	Aldershot ..	Dover (S).
" 9 "	12th (Woolwich) ..	9th Brigade	Woolwich..	Tilbury.
" 10 "	6th (Southern District) ..	15th Brigade	Portsmouth	Chatham.
No. 1 Field Hospital ..	18th (Home District)..	1st Division	London ..	London.
" 2 "	7th (Western District)	2nd and 3rd Cavalry Brigades	Plymouth..	Aldershot.

(S) This equipment is at present at Southampton, and is included in the embarkation stores kept there for a foreign expedition.

LIST OF REGULAR BEARER COMPANIES AND FIELD HOSPITALS, &C.

Unit.	Company from which the Unit is formed.	How allotted on Mobilization.	Place of Mobilization where First Regimental Equipment is kept.	Place where Second Regimental Equipment is kept.
No. 3 Field Hospital ..	10th (Thames District) ..	6th Division ..	Chatham ..	Chatham.
6 " "	13th (North British District) ..	2nd Division ..	Aldershot ..	Aldershot (S).
7 " "	14th (Dublin District) ..	4th Division ..	Dublin ..	Dublin.
8 " "	16th (Cork District) ..	5th Division ..	Cork ..	Cork.
9 " "	17th (Curragh) ..	3rd Division ..	Curragh ..	Curragh.
10 " "	8th (North-Eastern District) ..	9th Division ..	Aldershot ..	Aldershot (S).
11 " "	9th (Eastern District) ..	1st and 4th Cavalry Brigades, 8th Division ..	Warley ..	Warley.
12 " "	19th (North-Western District)	8th Division ..	Aldershot ..	Aldershot (S).
13 " "	19th (North-Western District)	7th Division ..	Aldershot ..	Aldershot (S).

Bearer Companies and Field Hospitals do not exist as units in peace; they are to be formed on mobilization from the various companies of the M.S.C., supplemented by their Reservists.

The personnel of the Medical Staff Corps which remains surplus after completing the units for the Field Army is allotted to Garrisons and Base Hospitals.

The remainder of the Bearer Companies in the Field Army are formed by the Volunteer Medical Staff Corps, and are, therefore, not included in this table, which applies only to the Regulars.

(S) This equipment is at present at Southampton, and is included in the embarkation stores kept there for a foreign expedition.

APPENDIX K.

SCHEDULE OF THE LISTS OF ORDNANCE STORES
REQUIRED BY UNITS, &c., ON MOBILIZATION,
REFERRED TO IN PARAGRAPH 35 OF THE
MOBILIZATION REGULATIONS.

No. of List.	Units, &c.
	<i>Field Army.</i>
1	Staff of a Brigade of Infantry.
2	Battalion of Infantry—Buff and Rifle.
2a	Battalion of Infantry—Guards.
2b	Battalion of Infantry—Militia.
3	Infantry Machine-Gun Section—Regulars.
3a	Infantry Machine-Gun Section—Militia.
4	Company Army Service Corps with Infantry Brigade.
5	Bearer Company, Regulars or Volunteers.
6	Staff of a Division of Infantry.
7	Regiment of Cavalry.
8	Corps Troops Ammunition Column.
9	Infantry Divisional Ammunition Column.
10	Field or Fortress Company, Royal Engineers (as Field Companies).
10a	Field Company, 1st London Engineer Volunteers.
11	Company Army Service Corps with Infantry Division.
12	Field Hospital.
13	Staff of an Army-Corps.
14	Regimental Staff, Corps Artillery.
15	Regimental Staff, Corps Engineers.
16	Pontoon Troop, Bridging Battalion, Royal Engineers.
17	Head-quarters and Sections of Telegraph Battalion, Royal Engineers.
18	Field Park, Royal Engineers.
19	Company Army Service Corps with Corps Troops.
20	Company Army Signallers, dismounted.
21	Staff of a Brigade of Cavalry.
22	Regiment of Household Cavalry.
23	Cavalry, Machine-Gun Section.
24	Mounted Infantry, Machine-Gun Section.
25	Cavalry Brigade Ammunition Column.

APPENDIX K—*continued.*SCHEDULE OF THE LISTS, &c.—*continued.*

No. of List.	Units, &c.
26	Mounted Detachment, Royal Engineers.
26a	Balloon Section, Royal Engineers.
27	Companies of Mounted Infantry.
28	Company Army Service Corps with Cavalry Brigade.
29	Military Police, personal outfit and saddlery.
30	Army Post Office Corps, personal outfit.
31	Medical Staff Corps, arms and accoutrements.
<i>Units allotted to Garrisons and unallotted Units.</i>	
37	Unallotted Household Cavalry Regiment.
36	Unallotted Cavalry Regiment—Line.
34	Royal Artillery—Garrison.
35	Battalion of Guards—except those in Field Army.
32	Battalion of Infantry—Regulars (garrisons).
38	Battalion of Infantry—Regulars (unallotted).
33	Militia—Artillery, Engineers, and Infantry (garrisons).
39	Militia—Infantry Battalion (unallotted).

NOTICES OF BOOKS.

Rulers of India. Ranjit Singh. By Sir LEPEL GRIFFIN, K.C.S.I. Oxford : Clarendon Press, 1892. Pp. 223. Size $7\frac{3}{4}'' \times 5'' \times \frac{3}{4}''$. Weight under 1 lb. Price 2s. 6d.

A work in this form has long been wanted, containing as it does a short history of the master mind which moulded the varied elements of his co-religionists into the most formidable fighting machine it has ever been our lot to encounter in the East, whilst later on the sect from which it was raised provided us with the brave and trustworthy native troops and allies without whose aid and loyalty during the Mutiny our hold upon India would not have been re-established, except with a ruinous expenditure of blood and treasure, and whose conduct before and since in many a hill campaign on the N.W. Frontier and Afghanistan affords sufficient evidence that the race has not deteriorated in their military qualities since their submission to British rule.

This history has been written by one whose great experience on the spot renders him master of his subject, and following as it does closely upon that of "Scindia" and the Mahrattas (in the same valuable series), which brought us to the south bank of the Sutlej, the volume now before us carries us over that stream into the interesting country of the Five Rivers, and gives a clear insight into the origin of the Sikhs, their occupation of the Punjab, and ultimate formation by Ranjit Singh into a vast military organization to the time when the want of foresight and the military incompetence of his successors led to their rupture with the British Government, with the result which has added one more to our vast responsibilities in the East.—M. G.

From Her Majesty's Stationery Office has just been issued in a shilling pamphlet, under the title of *The Capture of Valparaiso in 1891*, the reports of the Commander-in-Chief and the Chief of the Staff of the Constitutional Army. The pamphlet has been prepared in the Intelligence Division, War Office, and is preceded by a preface from the pen of Captain C. A. COURT, Rifle Brigade, Staff Captain, which we give *in extenso* :—

Introduction.

Early in January, 1891, a revolution broke out in Chili, the army declaring for President Balmaceda and the navy for the Congress or Constitutional party.

Owing to the above cause, and to the peculiar configuration of the country, the operations of the first few months were of a desultory character.

The Dictator was unable to undertake offensive operations against the northern provinces, where the Congress party was firmly established, owing to the difficulties of the country intervening between Coquimbo and Iquique and the want of sea power; his opponents were also unable to act decisively in the south until they had organized an army sufficient in numbers, discipline, and armament to overcome the resistance they were certain to encounter at Valparaiso.

The organization of an expeditionary force, nearly 10,000 strong, for this latter purpose, occupied the Congress party for the first seven months of the year; volunteers came in freely, and after a time a sufficient supply of arms and ammunition was secured, including some 4,000 Männlicher rifles.

It was necessary for the Congress party to strike hard and quickly.

Balmaceda was expecting an ironclad and two cruisers from France, the arrival

of which, coupled with the sinking of the Congress ship "Blanco Encalada," might have shifted the balance of sea power and have altered the whole conditions of the war.

It is true that the Dictator had a force of over 20,000 men at his disposal, and was, in particular, superior in artillery, but 6,000 men of this force held Coquimbo and were cut off from Valparaiso when their opponents landed in Quinteros Bay.

The Congress cause was also undoubtedly popular with all classes of the people; it was animated by a determined spirit, and in leadership was far superior to its opponents.

Balmaceda's forces were, on the other hand, to a great extent recruited by force, and the manner in which prisoners and deserters joined the ranks of the Congress party after their landing testifies to the unpopular nature of the Dictator's rule.

Prompt action was therefore demanded by all the circumstances of the situation, and the success of the operations amply justified the foresight of the Constitutional leaders.

The following reports deal solely with the operations from the 20th to the 28th August, which resulted in the capture of Valparaiso, and the overthrow of the Dictator.

They afford numerous and instructive lessons of especial interest to a maritime Power, while from a broader point of view they prove, if proof were needed, that the command of the sea, although the first essential for a sea Power, is not and cannot be of itself sufficient to secure *decisive* results in war, which can only be attained by the intimate alliance of both the land and sea forces of a State, acting together in close conjunction for the attainment of the national aims.

It would be unwise to attempt to make any final or definite deductions from the tactical experiences of the Chilians during this campaign, owing to the peculiar composition of the opposing forces. At the same time, there are certain points to which attention may be directed, as they serve as indications, not without a certain practical value.

About a third of the Congress troops, namely, the infantry and artillery of the 2nd Brigade, one battalion of the 3rd Brigade, and the rifles were armed with the Männlicher repeating rifle, pattern 1888. The effect produced on the Dictator's forces by the rapid fire and long range of this weapon greatly contributed towards their demoralization and defeat. On the other hand, the expenditure of ammunition was so great that at Concon the troops armed with the Männlicher, going into action with some 150 to 200 rounds a man, were reduced to only 10 per rifle at the close of the fight, and owing to the difficulty encountered in bringing up a fresh supply, they were, for twelve hours, practically disarmed, and the victory could not be followed up.

It should also be noticed that a reliable eye-witness counted 300 Männlicher rifles at Concon and Placilla with the bolts blown out.

With regard to the battles themselves, we have little information as to the formations adopted by the opposing forces; the Congress troops appear generally to have formed thick lines of skirmishers, followed by supports, while their enemies, as a rule, seemed to have retained closer formations, and to have shown little experience in the choice and occupation of ground.

In artillery, Balmaceda was distinctly superior, but for the most part the guns used by both sides were mountain pieces, and the ground was unfavourable to the movements of the field batteries.

The cavalry on both sides were not much used for reconnoitring purposes, and neither side secured any advantage in this respect.

The Congress cavalry executed some bold charges on infantry and guns in both actions; at la Placilla, Colonel Canto asserts that the attack of his cavalry decided the fate of the battle.

In both battles we find, reproduced on a smaller scale, the difficulty attending frontal attacks and the necessity of combining with them a strong effort against one or both flanks.

Lastly, the resort to night marches will not escape notice, and attention should be directed to the disappointments and confusion which must inevitably attend

such movements in default of a highly-trained staff and troops thoroughly in the hands of their leaders.

The Science of Metrology; or Natural Weights and Measures. A Challenge to the Metric System. By the Hon. E. NOEL, Captain, Rifle Brigade. London: Stanford, 1889. Pp. 80. Size $8\frac{3}{4}'' \times 5\frac{3}{4}'' \times \frac{1}{2}''$. Weight under 10 oz. Price 2s. 6d.

Metrology is the "science of measuring." Captain Noel states that the question of metrological reform has been for nearly a century before the public, and that some efforts have been made at improvement, and some changes which can fairly be called "revolutionary" have been not only seriously proposed, but strenuously urged. Yet, on a subject in which it is generally acknowledged that reform is wanted, we have not hitherto been able, in this country or in America, to make up our minds what this reform should be. There are some points in metrology which require the handling of the scientist and specialist, but in its broad principles and ordinary details it is a subject within the reach of us all. Captain Noel endeavours to deal in a popular form with the subject, and to show that by very little alteration, by a little amending, the existing English measures can be welded into a system scientifically as well as practically superior to the metric, a system which he says is in many respects faulty. He claims for his own system that it is founded on *Nature*, and worked out on practical lines.

Captain, now Major, Noel has extended his efforts at reforms of this character to those connected with time, and in a shilling pamphlet, published also by Messrs. Stanford, and entitled *International Time*, produces a scheme for harmonizing the hour all the world round.

Alphabetical French-English List of Technical Military Terms, for Military Students. By MARIUS DESHUMBERT, Professor of French at the Staff College, author of "The Dictionary of Difficulties met with in French;" with a Preface by Colonel F. MAURICE, C.B. 2nd edition. London: Nutt, 1892. Pamph. Pp. 47. Price 1s. 6d..

Colonel Maurice writes: "The present list of corresponding terms is much more than a mere translation from one language to another. It required for its composition that the man who wrote it should not only be thoroughly acquainted with both languages, but that he should know well the regulations and organizations of both armies.

"In many cases it is quite as necessary not to attempt a translation, but to show that there is no equivalent in the one Army for a term used in the other. Thus, for instance, a man not thoroughly acquainted with the organization of the French Army would be sorely tempted, when he found the word 'Major-Général' in French, promptly to translate it as 'Major-General' in English. M. Deshumbert has to tell him that we have no equivalent in English for the position to which the name 'Major-Général' is assigned in French. . . . It very rarely happens that any one should acquire so complete a knowledge of the conditions of two countries in regard to a particular profession as M. Deshumbert possesses, and the English Army will certainly owe him a debt of gratitude for the assistance which in this matter he is able to render, and has rendered."

The Localization of our Forces Revised. By Major H. G. PURDON. London: Gale and Polden. Pamph. Pp. 36. Price 2s.

Major Purdon, of the North Staffordshire Regiment, puts forward a revision of our localization scheme, in which he proposes to rearrange the regimental districts in certain cases, in order to give them a fair and better chance of fulfilling their requirements, which many of them do not possess at present. Also in the case of Auxiliary Forces, it has been endeavoured to arrange them in a more symmetrical manner, and to establish a properly-distributed proportion between the different arms of our heterogeneous Reserves. To prepare a pamphlet of this kind, containing even only three dozen pages, must have necessitated a great expenditure of time, labour, and research on the part of the author, but it is to be feared that only

experts thoroughly versed in the intricacies and details of localization schemes can pronounce on Major Purdon's proposals any judgment worth listening to. The subject is one which might, perhaps, be usefully discussed at the Royal United Service Institution.

A System of Instruction for Small Patrols. Translated from the French of Captain B——, by J. FORMBY, Major 3rd Vol. Batt. The King's Liverpool Regiment. Published for the Manchester Tactical Society, by Stanford, London, and Cornish, Manchester, 1892. Pamph. Pp. 35. Price 6d.

This is an excellent little pamphlet, and it is strongly recommended as affording valuable hints to not only teachers in teaching but as supplying a knowledge of the minute details of patrolling.

Guide to Promotion: an Aid to Officers of all Arms in Preparing for Examination in Regimental Duties. Part I. *Ranks of Lieutenant, Captain, and Major.* By Lieutenant-Colonel Sisson C. PRATT (late Royal Artillery). London: Stanford, 1892. Pp. 200. Size $7\frac{1}{4}'' \times 4\frac{3}{4}'' \times \frac{1}{2}''$. Weight under 10 oz. Price 7s.

This part deals with discipline, duties, interior economy, movement of troops, arms, ammunition, and equipment. In the preface we are told, "The system of question and answer followed by the late Lieutenant-Colonel Bannatyne in his well-known 'Guide to the Examinations for Promotion in the Infantry,' has been adopted, but an attempt has been made to make the answers short, clear, and explanatory, instead of merely quoting *verbatim* the text-books."

Field Service Pocket Book. Arranged by Captain E. N. WATHEN, 2nd Leinster Regiment. London: Allen. Size $5\frac{1}{4}'' \times 3\frac{1}{2}'' \times \frac{3}{4}''$. Weight under 8 oz. Price 5s.

This book consists of 25 pages of matter, containing memoranda for ordinary field and reconnaissance work. Then comes a "refill" section holding 18 sheets of writing, 12 of tracing, and 15 of waterproof sketching paper, each of which is $5\frac{1}{2}'' \times 6''$, and can be detached whole. The sketching paper is ruled in squares. Carbonized paper is provided for duplicates of messages. Two cases of envelopes are inside the covers, and black, blue, and red pencils are attached to the cover.

Text-Book of Fortification, for the use of the Royal Military College, Sandhurst. By Colonel G. PHILIPS, Royal Engineers, late Professor of Fortification, Royal Military College. 5th edition. By authority. London: Pardon & Sons, 1892. Pp. 310. Size $9\frac{3}{4}'' \times 6'' \times \frac{3}{4}''$. Price 15s.

Colonel Philips' book has always stood out pre-eminently from others of its kind as at once the best to teach from and the best to learn from. Thanks, we believe, to the present Director-General of Military Education, the educational establishments and classes have been saved from what at one moment threatened them, one text-book for general use throughout the Service; and the thanks of Sandhurst Cadets and Militia Officers are due to that high official for keeping for them a text-book so clearly written and so suited to their needs as that which is the subject of this notice.

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FOREIGN SECTION.

THIS portion of the Number, hitherto the Occasional Notes, has now become the Foreign Section, and is reserved for articles, either original or compiled, on professional subjects connected with Foreign Naval and Military matters; also for notices of Professional Books, either Foreign or English.

It is requested that articles, communications, and books for review may be addressed to the Editor of the Journal at the Royal United Service Institution, Whitehall Yard, London, S.W.

As with this issue terminates my sixteen years' editorial connection with the Journal, I desire to offer my sincere thanks to the Naval and Military Officers who have so kindly assisted me during that period by the contribution of original articles or translations, and also to those who have from time to time given to the Journal their honest and candid opinion of books sent to the Journal for review.

I also desire to express my obligations to my colleague, Captain Boughey Burgess, for much assistance, kindly and cordially rendered.

LONSDALE HALE,

Colonel R.E. ret.

THE STRATEGIC POSITION IN THE MEDITERRANEAN.

Translated, by permission, by Commander H. GARBETT.¹

FOR some time past there has been an uneasy feeling, which has found expression in the Press of Austria, Germany, and Italy, that the strategic position in the Mediterranean is undergoing a change, which, while tending to strengthen France and give her a commanding position in those waters, will prove detrimental to the interests of England and the other Powers.

The reason for this disquietude is to be found principally in the use France is making of her Protectorate over Tunis to construct at Biserta a strongly fortified naval port of the first importance. The construction of this port, which from its position completely commands the route between Gibraltar and the Suez Canal, is a new factor in the strategic position which England can hardly afford to overlook. For many years there has been considerable difference of opinion as to the feasibility or otherwise of using the Mediterranean route to the East in the event of this country unfortunately becoming involved in a war with France, and the creation of a naval stronghold at Biserta will certainly render the task of defending that route more difficult. It may therefore be of interest if I lay before readers of the *Journal* articles which have lately appeared on this subject in two of the principal Continental papers, viz., the "*Norddeutsche Allgemeine Zeitung*," the leading Berlin organ, and in the "*Neue Freie Presse*," the principal Vienna journal.

There is no doubt in France a party, of which the late M. Gabriel Charmes was a distinguished member, which includes what is known as the "*Jeune École*" in the French Navy, and numbers in its ranks distinguished Officers, such as Admirals Aube, Réveillère, and others, whose avowed aim is to make the Mediterranean, or at least that portion of it included between Gibraltar and a line drawn from Toulon through Corsica to Biserta, a French lake; it is hoped to make this Toulon—Corsica—Biserta line an impregnable base from which to operate with effect against Italy and ourselves. Another struggle with their "hereditary enemy," as England is termed in "*La Guerre contre l'Angleterre*," by the authors of "*Les Guerres Navales de Demain*," is confidently assumed as being as probable in the near future as one with Germany and Italy. Although the authors of

¹ From the "*Norddeutsche Allgemeine Zeitung*," of Berlin, the "*Neue Freie Presse*," of Vienna, an article in the "*Nouvelle Revue*," by Commandant Z., "*La Défense Maritime de la Corse*," and précis of articles in the "*Jahrbücher für die Armee und Marine*," by Lieutenant-Colonel von Hildebrandt and the "*Neue Militärische Blätter*."



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the above-mentioned work do not apparently consider that the French Fleet is likely to be a match for the English, yet they count upon the possibility, if the English Fleet is distributed over the Mediterranean, that a strong squadron of their own at Biserta, operating as it would on an inner line against a widely separated enemy, would be able to strike a decisive blow against the English division in the East before assistance could come up from Gibraltar, for instance.

In this connection the position of Corsica in the strategic line has been warmly discussed, both in the Chambers in the debates on the French Naval Budget, and in naval circles. Italy, by the care and money which she has spent during the last few years on the fortifications of Maddalena, an island lying almost on the extreme north-east point of Sardinia, closing a fine bay, and on the establishment there of a strong naval station which commands the Straits of Bonifacio, has certainly done her best to neutralize the strategic value of Corsica as a base from which the western seaboard of the peninsula can be threatened. The Ministry of Marine and French naval opinion are now quite awake to that fact, and an article, therefore, on "*La Défense Maritime de la Corse*," by Commandant Z., a member of the "*Jeune École*," and one of the authors of "*Les Guerres Navales de Demain*," which appeared in a late number of the "*Nouvelle Revue*," may also prove of interest.—H. G.

"The position of Carthage," writes the "*Norddeutsche*," "was without any doubt an incomparably more favourable one for maintaining command of the Mediterranean than that of Rome and its unimportant harbour of Ostia, and, indeed, it was owing to this favourable position, in conjunction with the statesmanship of its rulers and the activity and skill as seamen of its population, that the Punic capital was enabled to remain for so long the rival of Rome as mistress of those seas.

"Although not situated on the same site as old Carthage, the ruins of which lie some 8 miles off in a north-westerly direction in the neighbourhood of Cape Blanc, Biserta, the new base of the French Fleet in the Mediterranean, possesses a position for a war harbour so favoured by Nature that it not only vies with that of Carthage in every respect, but is superior in many points. A natural basin, over 2 German miles long and 1 broad, with a uniform depth of 40 ft., completely secure both from the force of the sea and from a hostile bombardment; the harbour of Biserta connected with the sea by a navigable canal 7·5 km. long will afford shelter to all the fleets of the world. This canal has been dredged out to allow the passage of ships drawing 30 ft. Two huge moles, each 1 km. long, are intended to protect the entrance into the canal. The Gulf of Biserta forms an advantageous approach to the harbour for a fleet, while the steep limestone cliffs of the surrounding coast render the fortification of the whole locality and the mouth of the harbour easy, as also of the town of Biserta, which is situated on the plateau. The position, in fact, possesses exceptional advantages for the establishment of a first-class naval station."

With regard to the strategic importance of this new French stronghold, Biserta appears to occupy a far more central position than Toulon, and in consequence of their propinquity it directly threatens the south and south-western coasts of Italy, Sicily, and Sardinia in the event of war between the two countries; in the second place, Biserta commands the great trade route from Gibraltar to the East, as well as of vessels proceeding to or coming from the Tyrrhenian Sea.

From Biserta it is easy to reach Sicily in 12 hours, Naples in 36 hours, and Maddalena in 24 hours, and a French squadron could reach in 36 hours any desired point on the coast of Sicily and most of the towns on the south-west coast of the peninsula and Sardinia.

If then the transformation of Biserta into a war harbour and station for the French Fleet affects most materially the military situation as far as the southern and south-western coasts of Italy are concerned, it is no less a matter of importance to England that the trade route through the Mediterranean should be commanded from such a base of operation so close as Biserta is.

The maritime position of Great Britain in the Mediterranean is threatened less by the fleets of her probable enemy than by the possibility afforded for the destruction of her trade and the interruption of the sea route to the East by ships issuing from secure harbours. Hostile squadrons will hardly be able to effect much against the strong fortresses of Malta and Gibraltar; but by attacks on the swarm of merchant ships which, even in war-time, would be passing between the Suez Canal and Gibraltar, cruisers issuing from Toulon, Algiers, and especially Biserta, would be able to inflict untold injury upon English trade. For such an onslaught on English ships by the French cruisers, Biserta affords a perfectly unique base. Formerly the possession of Gibraltar and Malta, and still later the occupation of Alexandria and Egypt, enabled England to command the route from the Atlantic to Suez; but to-day Biserta rivals Gibraltar and Malta in this respect, and it may be confidently asserted that the completion of this newly-created stronghold in 1894, as is the intention of the French Government, will necessitate, on the part of England, a very considerable increase to her naval strength in the Mediterranean if she is to maintain her supremacy in that sea.

The "Neue Freie Press," on the 1st of September last, calls attention to the same subject: "For some time past," it says, "a wrathful feeling has shown itself in the Italian Press at the feverish haste with which the French are pushing on the completion of the fortifications and the new harbour works at Biserta on the north coast of Tunis, which threaten alike the coasts of Sicily and Italy, Malta, and the English strategic route to India."

The international side of the question has also been partially discussed; but in the present state of our modern international law, it only occupies the second place. First stands the fact that a war harbour of the first rank is being built by France, and that the balance of power in the Mediterranean may consequently be altered

to the disadvantage of the "Triple Alliance." We remember that Prince Louis of Battenberg, Commander of the British cruiser "Scout," inspected the works in progress at Biserta, and expressed his conviction that the apprehensions entertained by Admiral Spratt in 1881 were not unfounded. The harbour of Biserta is only eighteen hours distant from Malta, and France manifestly intends to make it impregnable. Modern ships-of-war can reach the Sicilian coast from here in one night. The watchfulness and uneasiness of Italy and England have thus good grounds, and appear all the more intelligible, if the preliminary events of the present situation and the method of proceeding of the French are kept in view.

After the occupation of Tunis, France gave a formal promise not to convert Biserta into a war harbour, professing only to have commercial purposes in view. In the year 1886 a French Military Commission visited the coast, and soon afterwards a plan for its defence was worked out in Paris. The French Government then sent engineers to Biserta with orders to make surveys secretly, which were followed by the first Diplomatic representations on the part of the English Government. The French Cabinet still denied that it had any evil intentions; it did not feel quite secure yet in possession of Tunis, and did not then possess the patronage of Russia; since, however, they have had proofs of the favour of the Czar, the French have proceeded with more assurance, the old designs and plans have been brought out, and they have begun the construction of a war harbour of the largest dimensions. Before the Cronstadt fraternization all the French papers, without exception, were at the greatest pains to assure the world that there was no thought of anything but a mercantile port. The English and Italian remonstrances, and certain inquiries on the part of Germany, were alike met with a complete denial. Then followed a period of obstinate silence and of more energetic work, until the change in the situation created at Cronstadt gave France the courage to assert that Articles II and III of the Treaty of Bardo gave her the right to construct such a harbour. In this Treaty, France undertook the right and the duty of providing for the safety of Tunis and the protection of the Bey's dynasty. In vain were remonstrances that no one threatened Tunis and its Bey, and that in no case did this object justify the construction of a port at a cost of more than 15,000,000 fr. The voice of France has assumed a brusquer and more self-assertive tone, and the harbour of Biserta is now declared to be a work of "National Defence," and is destined to be the point of concentration of all the French maritime forces in the great, unavoidable, and decisive struggle for supremacy in the Mediterranean.

So the ancient Hippo, the most northern city of the Dark Continent, after a sleep of centuries, has again woke, and the political world suddenly hears of battles to be fought in the neighbourhood of the same spot where once Carthaginians and Romans strove for the mastery of the world.

In ancient times there was a large harbour with a deep and broad entrance, and several canals which, although they have since

become sanded up, render the construction of the present works much easier. Biserta is enclosed by two capes; in a southerly direction stretches the large so-called Lake of Biserta, 60 square km. in extent, which in days gone by served as a harbour, and is now again destined to become one of the principal ports of the world. It will hold the largest fleet, and is connected with the sea by means of a canal 60 m. broad, and which is already completed. A small bay adjoining this lake, and connected with it by a broad waterway, is destined for an auxiliary harbour, where ships damaged and under repair can find sufficient shelter. Of the two moles, each 3,000 ft. long, which, stretching into the sea, afford a secure entrance for ships, one is already half, and the other completely finished. A lighthouse is also being constructed upon the smaller peninsula of Sebra. When all these works are completed, to which must be added the fortifications in course of construction at the mouth of the deepened canal, and on the coast and adjoining highlands, Biserta will have become one of the largest and strongest of the war harbours of the world. High mountains protect it from the north and north-west, and the precipitous coast makes a landing almost impossible. The ruins of the ancient moles serve as foundations for the new, and the works are being pushed on with haste and successfully, at the time when Lord Salisbury and Crispi have been driven from power. In two years the French Government hope to have the work completed, but before then they will also have taken in hand the construction and fortification of the smaller harbours at Susa, Sfax, and Tabes.

The Italians look upon this state of things with great seriousness, and believe that its gravity will also be recognized in England. There can be no doubt that the French Government, under the pretext of making secure the communications between France and Algeria, will create in Tunis a safe base of operations, which, in conjunction with the greater preparedness for war, to be carried into effect by means of the new Naval Budget and the strength of the powerful fleet already completely equipped, will render it possible for France to attain supremacy over Italy and England. It is also considered in Berlin that Biserta will be a point of supreme military importance in the event of a war between France and the three Allied Powers, because it already constitutes a danger for the Italian Fleet, and threatens the coast of Sicily and Southern Italy. It strengthens the base of operations at Toulon by the creation of a new one. In presence of the concentration of superior French naval forces in Algeria and Tunis, it constitutes a real danger for England, threatening her communications with India and her Colonies, besides forcing her to divide her Fleet and keep two squadrons in readiness, one at Gibraltar and another at Malta. Sanguine French Officers are already counting upon the great advantage a strong French squadron at Biserta would have, as it would be able to operate on an inner line against a widely separated enemy, and could strike a decisive blow against the English squadron at Malta before the second could come up from Gibraltar, to say nothing of the "guerres navales" which, since the construction of Biserta began, the French "sea bears" are

continually planning against the Italian Fleet. Only last winter a French Admiral on the active list advocated the bombarding of all the Italian coast towns in turn with melinite shells, and the landing 40,000 Turcos in Sicily from Biserta and other African ports. And the coming war forms now in a time of peace the principal topic of conversation in the French barracks.

More and more does the consolidation of Italy, and her entrance into the Triple Alliance, arouse the jealousy of France. It is precisely in Tunis that Italian influence is a very disturbing element for France and her Mediterranean position. It is 10 years since France seized Tunis, after the recall of Sir Thomas Wood and the imprudence of the Italian Consul, Maccio, and the intimidation of Cairoli; on the other hand, the result of the action of France was to throw Italy into the arms of Germany and Austria, in order to find security in the Triple Alliance. Ten years have passed since the usurpation of the Regency in Tunis by the French, and their Protectorate over the country plays a very important part in the European relations of France and Italy, as well as those of Germany and Austria.

Thus, the Tunisian question seems destined to cement and maintain the Triple Alliance. Italy is now the principal hindrance to the development of the French power in Tunis, where, for the most part, the population is of Italian nationality. The southern Italians, accustomed to heat, abstinence, scanty food, and small gains, make good colonists, and they are five times as numerous as the French, and in time of war may prove a real danger for France.

The Tunisian question is only one of the great international disturbing elements, and although Biserta is only one point of the great surface upon which antagonistic interests are in imminent danger of clashing, and again disturbing the peace of the world, it is quite possible that the fate of Europe may yet be decided in the Bay of Carthage.

The only spot, writes Commandant Z., in the "Nouvelle Revue," where our flag flies between Algiers and Marseilles, Toulon and Biserta, Corsica constitutes the strategic bond by which the coasts of Languedoc and Provence are united to the shores of that French Africa which Prévost-Paradol showed us twenty-five years ago to be the last resource where our power would have an opportunity of displaying itself to the world.¹

In case of war against the "Triple Alliance," this island, by its situation, 50 miles from Civita Vecchia, is the natural base from which our squadron would undertake offensive operations against the left flank of Italy. If again we look at it from the point of view of a war with England, which is always possible, its defensive value is incomparable, and strikes the eyes even of those persons who are unversed in matters appertaining to naval warfare.

¹ "May the day soon come when our fellow-citizens, too confined in French Africa, will flow over into Morocco and Tunis, and will then found that Mediterranean Empire which will not only be a satisfaction for our pride, but which will certainly in the future state of the world be the last resource of our greatness."—Prévost-Paradol, "La France Nouvelle," année 1867.

For all these reasons, since our great reverse, and, above all, since the House of Savoy entered into alliance with the two Empires of Central Europe, Corsica ought to have been a source of constant attention on our part. Unfortunately, so far from making it the object of solicitude, the French Admiralty, as every one knows, has appeared to ignore the very existence of this admirable strategic position. In 1886, sixteen years after the lesson of Sedan, as far as the Admiralty were concerned, there was no such place as Corsica. Neither the excitement created by the publication of Admiral Aube's celebrated treatise, "Italy and the Levant," nor even the extensive works carried out at Maddalena,¹ were successful in opening the eyes of the men to whom the sole direction of our Navy was then entrusted.

When Admiral Aube came to the Ministry in January, 1866, Corsica was one of his first cares; and we can never forget with what sad astonishment he ascertained that absolutely everything still remained to be done there. Unhappily, here, as elsewhere, he had not time to complete his work. But when he quitted the Ministry, at the fall of the Goblet Cabinet (May, 1887), the question, thanks to his efforts, had made great progress.

1st. The plans and Estimates necessary for securing the "Défense Fixe" had been drawn up, thanks to the Navy, and approved at the Ministry of War.

2nd. The organization of the "Défense Mobile" had been seriously taken in hand, since it already comprised an "aviso" and several torpedo-boats, under the orders of Rear-Admiral Regnault de Presmenil.

3rd. The plans for building a harbour of refuge for the squadron at Porto-Vecchio had been under consideration.

The successors of Admiral Aube, MM. Krantz and Barbey, have pigeon-holed all these papers, and they have not been seen again; they have suppressed the gun- and torpedo-boats, and recalled Admiral de Prémenil.

The abandonment was as complete as possible, when last year

¹ From a tactical point of view, the position of Maddalena permits an Italian squadron to debouch, according to circumstances, either to the north-west or to the east, and to completely close the Straits of Bonifacio to an adversary. The defensive works constructed there during the last few years have had for their object to protect from a *coup de main* the basin where the fleet would be anchored, and to prevent an enemy gaining access to it. Maddalena has not only become a closed port, with the power of rendering the Straits impassable, but also combines all the conditions for becoming a real *place d'armes* with an entrenched camp. The central position is protected by groups of little islands and reefs, which render the approach difficult for large ships; further, towards Sirocco, the south point of Caprera forms a second position, which covers the Bay of Arsachera, and this bay has direct communication with the plateau of Ozieri, the site of the entrenched camp established for the protection of Sardinia. Maddalena is the strategic centre *par excellence* of that "counter-offensive" by which the Italian Fleet can defend the whole Tyrrhenian basin, and nothing has been neglected which will assist in placing the position in a condition fit for occupying the rôle it will be called on to play in the event of war. There are 70,000 tons of coal stored there.

M. Henri Brisson was nominated chairman of the Committee to report on the naval Budget.

M. Brisson did not hesitate to take up on his own account a part of Admiral Aube's programme; he called attention to Porto-Vecchio, and proposed to establish a station for light torpedo-boats on the island, but he was soon forced to resign, and his successor, M. Cochery, a slave of the bureaux, allowed the lamentable *status quo* to continue. However, when the budget was discussed before the Chamber, M. Ed. Lockroy, inspired by the ideas of Admiral Aube, proposed an amendment in these words:—

“ Clause 24 (Extraordinary works for the defence of the military ports) to reduce by 950,000 francs. To substitute in same clause, ‘For creation of a port of refuge in Corsica,’ 950,000 francs.”

M. Lockroy made no secret that, in his opinion, these 950,000 francs ought to be deducted from the sums destined for the scandalous works of the port of Cherbourg, and nothing could be more just, for the millions thrown into the bottom of this “indefensible” harbour are simply done so in order to serve electoral interests. The amendment was accepted on principle by the Minister, M. Barbey, who showed in his reply that his administration had never troubled itself in however small a degree about this grave matter:—

“ M. Barbey: ‘I have told the Honourable M. Lockroy that in principle I am not opposed to his suggestion; but I have pointed out to him at the same time that there is a Military Government in Corsica, under whose orders the Senior Naval Officer is placed. I can do nothing without consulting the Government, and particularly the Ministers of War and Public Works, with regard to the proposal of M. Lockroy; but I will take upon myself to satisfy his wish by putting the question before the General Staff of my department, and by submitting the proposal to the consideration of my colleagues.’ ” (“ Officiel,” 11th December, 1891.)

Satisfied with having forced the Minister of Marine to direct his attention towards a problem the prompt solution of which is of such great importance to the naval defence of the country, M. Lockroy thought he ought to withdraw his amendment. We think the distinguished Deputy was wrong in so doing, for two reasons: First, because we can foresee that M. Barbey will not keep his engagements; then, again, because it is inconceivable that a French Chamber would dare to thrust into the background a proposition so evidently in the interest of the nation.

Be that as it may, the question, at the time at which we write, has not advanced a step. But M. Barbey has been replaced by M. Godefroy Cavaignac, and certain indications allow us to believe that the new Administration is not indisposed to resume in Corsica the interrupted work of Admiral Aube. The moment then seems to us favourable for pointing out roughly what will be expedient in order to place the island in a position to fulfil its part in the wars of to-morrow.

It is indisputable that the next war will open in the Mediterranean by a *coup de main* upon Corsica. All the dispositions of Italy for

this have been taken, and well taken, for some time past. From this point of view the two places most menaced are evidently Bastia and Bonifacio.

The vicinity of the island of Elba warrants very strongly an attempt upon Bastia. The enemy will disembark either to the north of the town or on the coast to the west at the bottom of the Gulf of St. Florent. St. Florent will, without doubt, be preferred, because from there, not only is Bastia menaced, but also the position of Rousse island, Calvi, Corti, and all the rich peninsula of Cape Corsica, which Bastia once occupied will naturally also fall.

Calvi has no outlets; it ought to be replaced by Rousse, the harbour and roadstead of which are far superior to those of Calvi.

Ajaccio, as a maritime station, is of great importance; the largest ships can enter the road and landing is easy. From the point of view of an occupation of the island, the place has only a secondary importance on account of the small number and difficulty of the roads leading into the interior.

Propriano has a certain value, in so far that this small port, which offers good anchorage, might be chosen as a place of disembarkation in order to effect a *coup de main* against Sartène, which is only some 14 km. distant. The other points of the coast can be put on one side, as the "Défense Mobile" will suffice to guard them. It must be noted, however, that the Gulf of Sagone might serve as a place of disembarkation to an enterprising enemy for a force whose "objectif" was Ajaccio.

Bonifacio is the place which ought to be put in a state of defence with as little delay as possible. Its harbour, narrow and deep as a fiord, is the natural refuge of a flotilla detailed to watch the Straits and southern extremity of Corsica.

This portion of the island comprised between Bonifacio on the west and Santa Manza on the east forms a triangle, almost isolated in consequence of its remoteness and the paucity of the means of communication with the interior. In its present state of defence a disembarkation at Santa Manza, with Bonifacio for its "objectif," could be effected with success. Once master of Bonifacio, the enemy, without advancing further, could confine himself to holding the whole of the Strait; and the vicinity of Maddalena would render any attempt to dislodge him from the sea extremely hazardous.

The defences of Bonifacio are at present ridiculously inadequate, especially if they are compared with the means of attack concentrated at Maddalena and on the plateau of Ozieri by the Italian Admiralty. It is absolutely necessary to establish in the Straits a complete defensive system, of which Bonifacio would serve as the base. Not counting the "Défense Mobile," advantage must be taken of the neighbouring heights from Cape Pertusato and the islands Lavezzi and Cavallo, to construct powerful batteries which will command the Straits in front of Maddalena.

On the land side a work must be thrown up at the junction of the roads from Ajaccio and Bastia strong enough to check any attack attempted through a landing at Santa Manza.

To the north of Santa Manza, on the east coast, lies the fine Gulf of Porto-Vecchio, to which we will again refer.

From Porto-Vecchio to Bastia, the coast is low, marshy, and almost uninhabited; adjoining is the lake of Urbino, which, in ancient times, was an active harbour, and which certain Officers imagine might be made useful for the Fleet in time of war: an idea which, in the present state of things, does not appear very practicable.

Having now pointed out the places on the Corsican coast where our enemies might attempt a *coup de main*, we will now consider the same coast in the light of a *point d'appui* for our naval forces.

The anchorage in some parts of Bastia is not very good, and often vessels cannot lie there when the wind is between N.E. and S.E.; they then have to take refuge at Saint Florent. At both places ships at anchor are liable to be surprised by torpedo-boats. Nevertheless batteries are necessary at Bastia to resist an attack on the place; and at Saint Florent to prevent any disembarkation.

A fort ought to be constructed on Rousse Island, less to protect the anchorage, which a squadron would probably never use in war, as to prevent any attempt by the enemy.

Ajaccio, an excellent anchorage, ought to be fortified both on its land and sea fronts. The sooner this is done the better, because at this moment the place is incapable of offering resistance to a landing combined with an attack from a fleet. A coast battery is also necessary at Propriano.

The "Défense Fixe" of Bonifacio ought to be completed in the manner we have already mentioned. Unfortunately, the port is too small to shelter a squadron, which would have to make for Porto-Vecchio, on the east coast, a fine harbour of refuge, and at the same time a strategic centre of the first order. It is a fact scarcely credible, the Gulf of Porto-Vecchio is completely abandoned!

During the Ministry of Admiral Aube two projects were discussed, which we ask permission to briefly explain. The first proposal was to close the grand roadstead between the points Saint Cyprien and La Chiappa by a breakwater divided into three: the first portion, 1,500 m. in length, reaching from the tower of Chiapino to that of Pécoralla, would be built in a mean depth of 23 m.; the second portion, 900 m. long, starting from the tower of Pécoralla, would run out towards the Saint Cyprien lighthouse to a depth of 15 m.; the third, 230 m. long, would be a prolongation of the second, between Saint Cyprien Light, and a depth of 10 m., with a mean depth of 8 m. There would thus be two passages, 200 m. long, each with a depth of 10 m.; the one from Point Chiappa to the lower Chiapino, the other between the second and third portions of the breakwater. The cost of these breakwaters can be calculated approximately by the formula $2h^2$, at the rate of 10 fr. to the cubic metre.

First breakwater, cost	$2 \times 22^2 \times 1,500 \times 10 = 14,520,000$	frances.
Second ,, 	$2 \times 14^2 \times 900 \times 10 = 3,528,000$,,
Third ,, 	$2 \times 8^2 \times 200 \times 10 = 256,000$,,

Total 18,304,000 frances.

To this sum would have to be added the expense of dredging out the small roadstead to a depth of 10 m., an expense which, on account of the nature of the bottom, would come to 7 millions of francs for 85 millions of cubic metres, making a total expenditure of 25 million francs.

The other project is more attractive, on account of the moderate cost. We start on the assumption that Porto-Vecchio is destined to serve both as a base of operations from which a French squadron can operate against the left flank of Italy, and as a refuge for that squadron after an action, whatever the result of that action may be. We say, whatever the result may be, because it seems evident to us that, after an action, the victor will in all probability stand in need of a shelter to repair damages, and ought not in any case to pass the night at sea, exposed under unfavourable conditions to the attacks of torpedo-boats.

By the second project, a harbour of refuge would be constructed sufficiently large to receive 12 battle-ships, 12 large cruisers, and as many small vessels of light draught as may be considered necessary.

The small roadstead would alone be protected by two breakwaters: the largest, on the north, drawn in a little in the west from the Point Benedetto, passes over a shoal, but at its northern limit has a depth of 10 m.; the other starts in the north-east, from the small Bay of Vizza, and at its southern limit has also a depth of 10 m.; between the two breakwaters would be a channel 200 m. wide. The first breakwater would be 900 m. long, with a mean depth of 5 m.; the second only 200 m., also with a mean depth of 5 m. Calculating the cost, as in the first project, the expense would only be 550,000 francs.

The dredging out of the bottom to a depth of 10 m., necessary for laying down the moorings for twenty-four large ships, as well as of the channel to the anchorage, which would be 1,200 m. long and 150 m. wide, would entail a further expenditure of 3,500,000 francs, bringing the whole cost up to 4,050,000 francs.

By laying down between the points Saint Cyprien and Chiappa two lines of submarine mines, and erecting on the heights some powerful batteries, an enemy would be kept at a distance. On the other hand, the part of the harbour where our ships would lie is masked from the side of the sea by the points d'Arena, Viazza, and the cliff which lies to the southward of those points; the ships at the anchorage would therefore not be visible from the sea.

The country to the north of Porto-Vecchio is very marshy, and covered with thickets, in which lie a thick bed of dead leaves; consequently the country is malarious to such an extent that in the hot season the inhabitants move up to Quenza, in the mountains. The cost of draining and making the plains salubrious would come to some 60,000 francs, according to an estimate made on the spot.

Thus for less than 10 millions Porto-Vecchio can be made an impregnable port of refuge, of which our squadrons in the Mediterranean stand so much in need, and from which they will be in a position either to act against the adjoining coast of Italy or maintain our communications with our possessions in Africa.

We have seen that the successors of Admiral Aube have done away with the "Défense Mobile," the organization of which was carried on from the commencement of 1886 up to May, 1887. It is necessary that it should be reconstituted without any further delay.

The "Défense Mobile" of a strategical position such as Corsica, at one and the same time, both offensive and defensive, ought to comprise, in time of peace, at least 5 fast cruisers and 24 torpedo-boats, fully equipped and in commission; in time of war this number would be doubled. The "Défense Mobile" should be divided into two groups: one in the north, with headquarters at Saint Florent; the other in the south, in the Straits of Bonifacio.

We have already mentioned that the two points where a landing can be most successfully attempted are Santa Manza and Saint Florent. The Bay of Santa Manza is only 15 miles from Maddalena. This distance can be traversed in an hour by transports with troops, whose numbers could be much reduced on account of the small distance which separates the base of operations from the point of attack and disembarkation. Six large steamers of the Rubattino Company will be sufficient to convey 15,000 men, drawn from the plateau of Ozieri and embarked at Maddalena; and it is evident that this operation could be completed before our squadron was in a position to oppose it. The actual concentration of our forces in the Mediterranean at one place leaves no doubt on this point. On the other hand, even in the absence of our squadron, the difficulties in the way of landing will be almost insurmountable, provided that we have in the Straits a dozen "torpilleurs" always ready for action, that the approaches to Bonifacio are armed with batteries powerful enough to prevent hostile cruisers and torpedo-catchers from destroying our flotilla at their anchorage, and if the scouting at sea by our fast "avisos" is organized as it ought to be, the Commandant of the "Défense Mobile" should be made aware immediately of any movements made by ships anchored at Maddalena.

In our opinion, it is from Saint Florent that Bastia will be threatened; therefore it is at Saint Florent that the "Défense Mobile" should be stationed. Surveillance there will be more difficult than in the Straits, because the distance from Elba is more than from Maddalena to Bonifacio (40 miles instead of 15); and then there are other reasons which militate in favour of Saint Florent as against Bastia. During fresh north-east winds, which are very frequent, torpedo-boats could not lie in the old port of Bastia, as they would be unable to leave the harbour if it was blowing fresh from that quarter. Imagine, in time of war, the situation of the Captains of the "Défense Mobile" receiving orders to put to sea, to share in some joint operations, and kept at anchor in spite of themselves, not by the state of the sea outside but by local difficulties!

Independently of the standing "Défense Mobile," a strong division of the active squadron of the Mediterranean ought to be detached to Corsica; there should be at least three of the coast-defence ironclads of the "Caiman" type, and three cruisers. To a certain extent this

would lessen the danger likely to result from the excessive concentration of our naval forces in the Mediterranean.

All reflecting and clear-sighted men are protesting against this insensate concentration, and demand that, with the vessels of which we can dispose to-day at Toulon, three independent squadrons should be formed :—

The Home Squadron, with Toulon as its headquarters.

The Squadron of Corsica, with Ajaccio as headquarters, and Porto-Vecchio as secondary base.

The African and Levant Squadron, at Biserta and Algiers.

Colonel von Hildebrandt, of the German Army, also discusses the Mediterranean question in an article in the “*Jährbucher für die Deutsche Armee und Marine*” for August, entitled “The Struggle for Supremacy in the Mediterranean.” A short *résumé* is all that is necessary. The Colonel dates “the foundation of the present condition of affairs from the year 1713, when England, by the Treaty of Utrecht, was confirmed in the possession of Gibraltar, and from that time began to assume the position of a Mediterranean Power.”

At the present time the Moroccan and Egyptian questions have directed general attention to the North African Coast territory, in consequence of the many conflicting interests centering there. For several years past France has pursued a steady policy of expansion from Algeria, not only into the interior towards the Western Soudan, but along the Mediterranean coast. By the seizure of Tunis, French power has perceptibly increased over what is already termed by many the “French Lake,” and this increase of strength is mainly due to the construction and fortification of the large harbour of Biserta, a point which strategically and politically is of the first importance. This new naval station of France, with the harbour of Goletta, at Tunis, may be said to command in all directions the great sea routes in the Mediterranean, and forms a base of the utmost value from which to carry on warlike operations. In the west France is also moving steadily forward; between Morocco and Algeria there is no strong natural boundary which would prevent the inroads of the robber tribes who inhabit the western fastnesses of the Atlas range, so an excuse has been found for pushing forward the Algerian frontier to the deep defile-like valley through which flows the Mulugia River. The new boundary, which is difficult to cross, affords sufficient protection, not only to the important military railway from Oran to Mescheria, but will also do so when the line is pushed on to the much coveted Tuat Oasis, from which commanding position France can wait with equanimity the inevitable break-up of the Shereefian Empire.

In the meantime, Italy having seen Tunis snatched from her by France, is throwing all the more longing glances upon Tripoli. For some years past she has been steadily strengthening her position as a Mediterranean Power, and in addition to now possessing a large and powerful fleet, she has added materially to the defence of her coasts by converting into naval stations and strongly fortifying Maddalena and Otranto.

But it is on the future absorption of Tripoli that the hopes of the

Italian Government and people are now mostly bent. Daily the number of Italian settlers increases there, and already the principal industries and commerce of the country lie almost entirely in their hands. Numerous agents have made friendly relations among the nomad Arab, Berberi, and Negro tribes, and are teaching them more and more to appreciate the value of commercial intercourse and the superiority of European wares. And Tripoli seems worth all this trouble. It is the key to the wide expanse of the Upper Soudan, and will open out roads for a brisk trade with the interior of the Dark Continent. Will, however, French jealousy permit an Italian occupation of Tripoli? Biserta and Goletta completely command the route between Italy and Tripoli. Shall we again see a decisive struggle for mastery between Rome and Carthage? As history shows, the most trifling incident often brings about an acute crisis. Italy views with much distrust the formidable works now being carried out at Biserta, which threaten to give France the power to thwart all her plans on Tripoli. In view of a possible attempt at a *coup de main* on Sicily, the Italian Government are fortifying, among other places, the conveniently situated harbour of Marsala, on the west coast of Sicily, which is only a day's run from Biserta.

Neither can England afford to despise the growing aspirations of France. Not only does Biserta threaten to cut the communication between Gibraltar and the East, but, when the Garonne Canal is completed, France will be in a position to rapidly, and without hindrance, reinforce her Mediterranean fleet. Malta, although occupying a strong position, may, under quite conceivable circumstances, be isolated. The Colonel comes to the conclusion that, as it does not seem likely that England will be able to establish another strong foothold as a set-off to Biserta and Algiers, she will only be able to hold her supremacy by, as in times past, maintaining a fleet of overwhelming strength in the Mediterranean.

He considers it unlikely that Spain, Austria, or Turkey will weigh for much in the coming struggle. The Austrian Fleet is only sufficiently strong to protect her own coasts. Spain, while coveting Morocco and asserting that to her belongs the reversion of that country, is certainly not in a position to enforce her claims, and unless a great change comes over the administration and spirit of the country, she will probably see the great prize snatched up, while she will be helpless to prevent it. Turkey, as far as her fleet is concerned, is, since the last war with Russia, practically *une quantité négligeable*.

"Whatever the solution of the Mediterranean question may be, it will, in any case, resolve itself into a trial of strength. The germs of the coming conflict extend along the North African coast, from the pillars of Hercules to the Nile Delta; and, when the outbreak comes, the prize of victory will, as in the past, so in the future, remain with the best prepared and the strongest."

Since the above was written, the Sultan of Morocco has yielded to the French demands, and ceded the Mulugia River as the frontier and also the Tuat Oasis.

The relations of England with the Triple Alliance form the subject of an article in the October number of the "Neue Militärische Blätter." The writer calls attention to the lively discussion which ensued, when the German Emperor visited England last year, on the question of the formal adhesion of Great Britain to the Alliance of the Three Powers. He points out that the question seems a simple one, because England's peculiar interests nowhere clash with those of the three States forming the Alliance, while the maintenance of European peace is a matter of the first importance to her. On the other hand, a struggle with Russia for supremacy in Asia and for the possession of India and one with France for supremacy in the Mediterranean seem almost unavoidable in the near future, while a collision in North-West Africa is also probable before long.

The Russo-French understanding, the incidents in Afghanistan and the Pamir territory, the presence of Russian emissaries in the Soudan, and the raising by Turkey again of the question of the evacuation of Egypt, with the growing influence of France and Russia at the Golden Horn, are drawing attention to the dangers ahead.

With the loss of India, England loses her position in the world; it can therefore be maintained that, on the one hand, she cannot dispense with the support of Germany and Austria, and that, on the other, she needs the assistance of the Italian Fleet; for the attitude of the two Great German Powers fetters to Russia's western frontier the largest portion of her forces, and in the event of a war with England would prevent her throwing large masses of troops on the seat of war in Asia. The junction of the Italian and English Fleets in the Mediterranean would secure a preponderance over the French Fleet, allowing for the co-operation with the latter under certain circumstances of the Russian Black Sea Squadron; but in order to maintain her communications with India and her Colonies, and at the same time to protect her interests in other parts of the world, it would seem necessary for England to still further strengthen her Fleet, and were she not secure of the support of Italy the increase in her ship-building rendered necessary would most appreciably swell her already heavy Naval Estimates.

On the other hand, also, it must be admitted that the Italian Fleet by itself is not equal to the French Mediterranean Squadron; Italy, therefore, on her side is thrown back upon the support of England for the protection not only of her extensive line of coast, which is accessible almost everywhere to the heaviest ships, but also for the safeguarding of the coast railways, which form the only means of communication by which her mobilization can be carried out.

Both countries, moreover, proceed more or less hand in hand in the northern and eastern portions of Africa, and the establishing of Italian rule in Erythrea, as also the extension of her sphere of sovereignty in the Somali territory, support the efforts of England in the Soudan as well as in the Lake region, besides tending to paralyse the influence of France which may be exercised through the possession of Obock.

So long as the influence of England predominated at the Golden Horn, that country ruled indirectly the north-eastern gate to the Mediterranean, as, through Gibraltar and Port Said, she held the western and southern ones. But there has lately been a turn in the wheel, and the Porte, yielding apparently to Russo-French influence, has again raised the question of the evacuation of Egypt; so England has let the keys of the Dardanelles slip from her hands, and in attempting to bring pressure to bear upon the Turkish Government, she may have to reckon under certain circumstances with the appearance of a Russian squadron from the Black Sea in the Mediterranean, and must therefore all the more take measures for securing the route to India.

France is the only country from which England can be threatened by invasion, but, so long as Germany and Italy do not at least observe a benevolent neutrality, and, above all, so long as France herself continues to inscribe on her banners the "*Revanche-Idée*," which chains her Army to the eastern frontier, so great an undertaking as a landing on the other side of the Channel may be considered as an impossibility, even if the English Channel and Reserve Squadrons should not prove equal to the task of completely assuring the protection of the whole coast.

The interests of Germany and Austria touch those of England in Colonial matters and in the Balkan countries. With regard to the first, no conflict is now likely to arise, and in the Balkan peninsula the interests of England and Austria are both opposed to those of Russia. The first must resist any strengthening of the Slav influence in those provinces and the latter the right of free passage through the Dardanelles.

There can be no question that a friendly understanding with the Powers forming the "*Triple Alliance*" is of immense advantage to England at all points where a conflict with France and Russia may be apprehended; a fact which is very evident to dispassionate, far-seeing, and cautious politicians on this side of the Channel. It must not be forgotten, however, when the possibility of a "*rapprochement*" to the "*Triple Alliance*" rouses so much discussion in the Press and Parliament, that, as history teaches us, the predominating idea of English politics is to avoid as far as possible all Continental complications and to draw as much advantage as possible from the weakening of other Powers.

If we now consider the question inversely, "*What advantage will accrue to the 'Triple Alliance' from an understanding with England?*" it restricts itself (for as regards Italy the question has already been answered) to what common action the German and English Fleets could undertake in the Baltic. The German Navy is sufficiently strong to defend the coast against the Russian Baltic Fleet; on the other hand, with the aid of a powerful English squadron, Germany might under certain circumstances be able to undertake the "*offensive*" against the Russian Baltic provinces, and an English squadron would also materially assist in defending the German coasts against a French Fleet. How far an English Fleet would be able to

take part in operations on the southern theatre of war would depend entirely upon the attitude of the Porte. But the question is, Would England be in a position to afford this support? And this seems to us more than doubtful.

The next great war will tax England's resources in Asia and Africa, perhaps even in America, in any case in the seas in all quarters of the globe, so completely that in the opinion of English authorities the greatest sea Power in the world will not in its present condition be able to afford support to the Alliance and at the same time perform its duties in all parts of the world, such as maintaining the communications with India and her Colonies, securing the trade routes, and defending her own coasts.

The advantages, therefore, to be gained from an alliance with England are of a very doubtful nature; the more so when the uncertainty of the continuity of English foreign policy is taken into account. From a settled alliance with England the Triple Alliance would undertake far-reaching responsibilities without receiving any satisfactory guarantees in return.

Nevertheless, a general conflagration in the future, brought about by the opposition of England to France and Russia, and the "Revanche-Policy" of the former, will, in self-defence, drive the "sea-ruling Albion" to the side of the Triple Alliance, for the defeat of the Central Powers would also entail in all probability the loss of her over-sea possessions to France and Russia.

As it is quite possible that England will some day find herself involved in hostilities with France and Russia, I have thought it as well to show, in connection with the position in the Mediterranean, what naval force Russia will have at her disposal in the Black Sea by the end of next year, and which, by an agreement with Turkey as to passage through the Dardanelles, could reinforce the French Mediterranean Fleet. Last year some alterations were made in the organization of the Russian Fleet, into the details of which, however, it is not here necessary to enter. The Black Sea Division now consists of:

Battle-ships.—"Catherine II," "Tchesmé," "Sinope," "George the Victorious," "The Twelve Apostles," and the two "Popoffkas" "Novgorod" and "Admiral Popoff."

Cruiser.—"Pamyat Merkurya."

Torpedo Cruiser.—"Kapitan Sacken," "Kasarski."

Gun-vessels.—"Kubanjez," "Zaporoschez," "Donjez," "Tepez," "Uraljez," and "Tschernomojez."

Torpilleurs de Haute Mer.—Sixteen.

Torpedo-boats, 2nd Class.—Seven; and several troop-ships and steamers for various purposes.

Of the above, all the battle-ships, with the exception of the two "Popoffkas," which are useless for everything except coast defence, are new and may be counted as of the 1st Class. The three first on the list are ready for sea; they are protected by a 16-inch steel belt, round the water line, with a central pear-shaped redoubt plated with 14-inch armour, in which they carry six 12-inch 56-ton B.L. guns mounted in pairs on disappearing carriages, two pairs forward at

each corner of the redoubt, and the remaining pair in the after part of the redoubt amidships. Their auxiliary armament consists of seven 6-inch guns and 16 quick-firing ditto, with six torpedo discharges. They are 10,180 tons displacement, engines of 11,000 I.H.P., with a speed of 16 knots. The "George the Victorious" and "Twelve Apostles" will not be completed until end of next year, but they are of the same type, with the same armour and armament. The cruiser is of an old type, and is only credited with a speed of 14 knots. She is built of iron and steel, and has an armament of four 18-ton B.L. guns and four 4-inch ditto. The six gun-vessels are all new; are 1,224 tons displacement, engines of 1,500 H.P., and a nominal speed of 20 knots; they are armed with two 8-inch, one 6-inch, and six quick-firing guns.

It will thus be seen that the Russian Black Sea Squadron, if it comes down through the Dardanelles, is a force which cannot be ignored in estimating the naval position in the Mediterranean. Two more battle-ships of a similar type have also lately been laid down.—H. G.

THE MAGAZINE RIFLE QUESTION.

Translated from the "*Jahrbücher für die Deutsche Armee und Marine*," June and September, 1892, by Captain F. L. NATHAN, Royal Artillery.

June, 1892.

WITH regard to the rifle calibre question and the points connected with it, a new stage has been reached through the action of Italy, of which mention has already been made (see "*Survey*," in vols. lxxx, lxxxi, and lxxxii). Calibres of from 10 mm. (0·3937 in.) to 11 mm. (0·4331 in.), inaugurated at the beginning of the decade 1860-70 by the Swiss ballisticians, and which received general recognition in 1866 with the universal acceptance of the quick-firing breech-loader, were followed, from 1886 onwards, by calibres of from 7·5 mm. (0·2952 in.) to 8 mm. (0·3149 in.), brought forward afresh by the Swiss, but first actually adopted in France.

Even in 1891 Russia still adhered to the first limits, on account of the difficulties connected with the production of her 3-line rifle (0·3 in.), inclining, however, rather to the lower than to the higher limit, whilst, at the same time, Italy, one of the Powers of the Triple Alliance, after she had satisfied the first requirements of a repeating rifle with smokeless powder, by means of a twofold process of transformation, took the daring plunge of adopting a new calibre of 6·5 mm. (0·2569 in.), thus saving herself a new equipment of the calibre previously in use, which would otherwise have been necessary.

Roumania quickly followed her example.

The Netherlands, which has till now imitated Italy, intends to do the same.

Spain, Greece, and Turkey, being Powers in unfortunate financial circumstances, still adhere to the second scale of calibres, after Turkey has lavished large sums on the unsatisfactory intermediate calibre of 9·5 mm. (0·374 in.), and now possesses three calibres at one and the same time.

In Spain the "*Junta mixta de Armas Portatiles*" has decided on the Mauser rifle (Pattern 1890) of 7·65 mm. (0·3012 in.), similar to that adopted by Turkey, with some slight alterations; it bears a close resemblance to the Belgian rifle, Pattern 1889.

Greece has decided in favour of the Austro-Hungarian rifle, Pattern 1888.

Servia is said to have decided on an intermediate calibre of 7·2 mm. (0·2834 in.).

Portugal had rather prematurely adopted a repeating rifle (Pattern 1886, Kropatschek system), and, considering her present financial situation, could scarcely decide on a new equipment.

Sweden is converting her large-calibre Remingtons into 8 mm. single loaders, and will very likely remain satisfied with them.

Going out of Europe, Japan contemplates an 8 mm. (0·3149 in.) rifle on the Murata system; Argentina has ordered 50,000 Belgian Mausers; and Chili has procured Austrian Mannlicher rifles (see "Umschau," vol. lxii).

In the United States of America, a special Committee has been sitting since the end of 1890, to study patterns of small-calibre repeating rifles, which have been sent to them in response to a general invitation to do so.

According to the "Mitteilungen über Gegenstände des Artillerie und Genie Wesens," October, 1891, only service rifles of foreign Powers, viz., of Germany, Austria-Hungary, England, and Belgium had been tried up to that time. The Minister of War requires a calibre of 7·62 mm. (0·3 in.), a copper-coated bullet, weighing with hard lead core, 14·9 gm. (217·4 gr.), and 2·33 gm. (31·37 gr.) of smokeless powder made by the Belgian factory at Wetteren, the prototype of the new home-made powder, which produced approximately a velocity of 610 m. (2,000 ft.-sec.). According to direct information, the Mauser rifle has given the most satisfaction. The authorities have decided that the experiments are to be concluded by the end of June of the current year.¹

To turn to literature; General Richard Wille, in his article which appeared in the summer of 1890, entitled "Wolfram Bullets" (published by R. Eisenschmidt, Berlin), advocated the diminution of the rifle calibre to 6 mm. (0·2362 in.); up to the present, however, he has not been justified by results in respect to the inadmissibility of coated hard-lead bullets, and the necessity of wolfram metal for such calibres.

Before Wille, the assertion made by Professor Fred. Wm. Hebler, of Zurich, in his work entitled "The Smallest Calibre, or the Future Infantry Rifle" (Zurich, 1886), viz., that a lower calibre limit should be fixed, met with universal favour. Taking the manufacture and cleaning of the bore into account, he fixed it at 7·5 mm. (0·2953 in.).

In the "Schweizer Zeitschrift für Artillerie und Genie," March, 1892, No. 3, Professor Hebler, in his treatise entitled "Shall we stop at a calibre of 7·5 mm. (0·2953 in.) or diminish it still further, and if so how far?" (first published in the Austrian "Schützenzeitung"), gives his opinion on the action of Italy in the matter, and assumes that technical difficulties no longer bar the way to the introduction of a still smaller calibre. He now investigates the best lower limit, and advises a reduction to a calibre of 5 mm. (0·1968 in.).

On the strength of his own experiments, he considers the 5 mm. (0·1968 in.) cartridge the best and most suitable for adoption, because the technical expedients of the present day allow barrels of 5 mm. (0·1968 in.) calibre to be produced without overwhelming difficulty, and because the smaller the calibre the more favourable are the

¹ *Note by Translator.*—The Committee has recently submitted its decision in favour of the Krag-Jørgensen No. 5, which is a considerable modification of the original Danish Krag-Jørgensen rifle.

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* Nominated by the War Office.

N.B.—The Figures 1, 2, 3 indicate the year of Service on the Council

MEMORANDUM.

1892.

NUMBER OF MEMBERS WHO JOINED THE INSTITUTION UP TO 1ST DECEMBER.

Month.	Life.	Annual.	
January	4	13	
February	2	16	
March.....	7	7	
April	5	10	
May	6	11	
June.....	5	9	
July	3	20	
August.....	3	3	
September.....	34	27	
October	43	174	
November	35	83	
	<hr/> 147	<hr/> 373	———— 520
Deduct.			
Deaths.....	26	49	
Withdrawals.....	0	38	
	<hr/> 26	<hr/> 87	———— 113
			<hr/> Nett increase..... 407

Donations up to 1st December, £2,745 1s.

BOUGHEY BURGESS, Captain,
Secretary.

1st December, 1892.

results obtained, with regard to flatness of trajectory, power of penetration, recoil, the humane nature of the wounds, &c., whilst at the same time a man can carry a greater number of cartridges.

Hebler recognizes only one valid objection to the 5 mm. (0·1968 in.) calibre, "That the maximum pressure is too high, so high that the locking lugs of the bolt will set up." Hebler reckons the pressure in the 5 mm. (0·1968 in.) rifle at 4,500 atmospheres (29·5 tons to the sq. in.), but thinks that the safety of the bolt is sufficiently insured by an invention of the Vienna gun manufacturer, Karl Krnka, for the bolt cylinder (4 lugs instead of 2, in the shape of a cross). Assuming the "value" of an 11 mm. (0·4331 in.) rifle with black powder to vary from 90 to 100, and of the 7·5 mm. (0·2953 in.) rifle with smokeless powder from 500 to 600; Hebler estimates the "value" of a 6 mm. (0·2362 in.) rifle at from 900 to 1,000 and of a 5 mm. (0·1968 in.) at from 1,300 to 1,400; justification for this estimate is, however, wanting. According to Hebler, with a weight of ammunition of about 4 kilo. (8·818 lbs.), the number of cartridges which the soldier can carry with him is about 140 with the 8 mm. (0·3149 in.), 160 with the 7·5 mm. (0·2952 in.), 220 with the 6 mm. (0·2362 in.), 250 with the 5·5 mm. (0·2165 in.), and 280 with the 5 mm. (0·1968 in.). He can see no difficulties in the manufacture of cartridges and envelope bullets of such calibre.

The following table gives some of the principal characteristics of the three groups of calibres above mentioned:—

Calibre.	Bullet.	Charge.	Load on the cross section.	Value of $\frac{d^2}{W}$	Velocity.	Weight of cartridge.	Pressure.
11.0 mm. (0.4331 in.)	25.0 gm. (385.8 gr.)	5.0 gm. (77.16 gr.) (black powder)	gm. on the sq. mm. 0.26	3.4	450 m. (1,476 f.s.)	42.0 gm. (648.0 gr.)	1,500 atm. (9.85 tons per sq. in.)
8.75 mm. (0.3444 in.)	14.0 gm. (216.05 gr.)	2.0 gm. (30.8 gr.) (smokeless powder)	0.29—0.30	3.84	600 m. (1,968 f.s.)	29.0 gm. (447.5 gr.)	2,500— 3,000 atm. (16.4—19.8 tons per sq. in.)
6.5 mm. (0.2569 in.)	10.5 gm. (162.04 gr.)	.. ..	0.31	2.85	700 m. (2,297 f.s.)	21.5 gm. (331.8 gr.)	5,000 atm. (32.8 tons per sq. in.)

N	Weight.	Muzzle velocity.	Pressure.	Load on the cross section (or value of $\frac{d^2}{W}$).	Recoil.
3	5 gm. 2 gr.)	632 m. (2,073 ft.)	..	0·298 gm. sq. mm. (3·0)	0·94 m.-kilo. (0·1925 lb. per sq. ft.)
5	5 gm. 43 gr.)	620 (520) m. (2,034 (1,706 ft.)	..	0·316 gm. sq. mm. (2·84)	1·11 m.-kilo. (0·2273 lb. per sq. ft.)
5	5 gm. 43 gr.)	620 m. (2,034 ft.)	3,200 atm. (21 tons)	0·293 gm. sq. mm. (3·0)	1·08 m.-kilo. (0·2064 lb. per sq. ft.)
5	5 gm. 0 gr.)	564 m. (1,850 ft.)	2,835 atm. (18·0 tons,	(3·0)	—
5	5 gm. 5 gr.)	686 m. (2,000 ft.)	15·0 tons)		
4	.	610—620 m. (2,001— 2,034 ft.)	..	0·304 gm. sq. mm. (2·9)	—
.	.	700 m. (2,296·6 ft.)	5,000 atm. (32·8 tons)	0·31 gm. sq. mm. (2·85)	—
4	5 gm. 0 gr.)	610 m. (2,001 ft.)	3,000 atm. (19·7 tons)	0·309 gm. sq. mm. (2·9)	1·1 m.-kilo. (0·2253 lb. per sq. ft.)
3	2 gm. 30·1 (.)	600 m. (1,968 ft.)	2,600 atm. (17·1 tons)	0·31 gm. sq. mm. (2·89)	0·86 m.-kilo. (0·1761 lbs. per sq. ft.)
6	6 gm. 9 gr.)	600 m. (1,968 ft.)	2,300 atm. (15·1 tons)	0·037 gm. sq. mm. (2·91)	—
4	4 gm. 0 gr.)	652 m. (2,139 ft.)	3,000 atm. (19·7 tons)	0·305 gm. sq. mm. (2·94)	—

No.	Country.	Year.	Maker.	Calibre.	Length.		Weight.				Barrel.	Sighting.	Grooves.		Bolt motion.	Magazine.	Method of loading.	Cartridge.								Muzzle velocity.	Pressure.	Load on the cross section (or value of $\frac{d^2}{W}$).	Recoil.
					Without bayonet.	With bayonet.	Empty.		Filled.				No.	Twist.				Material of case.	Length.	Weight.	Bullet.			Charge.					
							Without bayonet.	With bayonet.	Without bayonet.	With bayonet.											Material (case and envelope).	Length.	Weight.	Nature of powder.	Weight.				
1	France	1886	Lebel	8 mm. (0·3149 in.)	1·307 m. (4·26 ft.)	1·825 m. (5·98 ft.)	4·18 kilo. (9·21 lb.)	4·58 kilo. (10·09 lb.)	4·415 kilo. (9·73 lb.)	4·815 kilo. (10·61 lb.)	Uncased	250—2,000 m. (273—2,187 yds.)	4	24 cm. (9·45 in.)	Double	In stock	8 cartridges, including 1 in barrel	Brass.	75 mm. (2·95 in.)	29 gm. (447·5 gr.)	Hard lead. White metal.	31 mm. (1·22 in.)	15 gm. (231·5 gr.)	Smokeless flake powder	2·8 gm. (43·2 gr.)	632 m. (2,073 ft.)	..	0·298 gm. sq. mm. (3·0)	0·94 m.-kilo. (0·1925 lb. per sq. ft.)
2	Austria-Hungary..	1888-90	Mannlicher	8 mm. (0·3149 in.)	1·281 m. (4·2 ft.)	1·526 m. (5·00 ft.)	4·4 kilo. (9·7 lb.)	4·77 kilo. (10·51 lb.)	..	..	"	500—2,500 paces	4	25 cm. (9·84 in.)	Straight pull	Box	Clip with 5 cartridges	"	76 mm. (2·99 in.)	29·7 gm. (461·4 gr.)	Hard lead. Steel.	31·8 mm. (1·25 in.)	15·8 gm. (243·8 gr.)	Smokeless gun-cotton powder	2·75 gm. (42·43 gr.)	620 (520) m. (2,034 (1,706 ft.)	..	0·316 gm. sq. mm. (2·84)	1·11 m.-kilo. (0·2273 lb. per sq. ft.)
3	Germany	1888	Mannlicher	7·9 mm. (0·311 in.)	1·245 m. (4·08 ft.)	..	3·8 kilo. (8·37 lb.)	..	..	..	Cased	250—2,050 m. (273—2,241 yds.)	4	24 cm. (9·45 in.)	Double	"	"	"	82·5 mm. (3·24 in.)	27·3 gm. (421·3 gr.)	Hard lead. Cupro-nickel.	32 mm. (1·26 in.)	14·5— 14·7 gm. (223·7— 226·9 gr.)	..	2·75 gm. (42·43 gr.)	620 m. (2,034 ft.)	3,200 atm. (21 tons)	0·293 gm. sq. mm. (3·0)	1·08 m.-kilo. (0·2064 lb. per sq. ft.)
4	England	1889	Lee	7·7 mm. (0·303 in.)	1·266 m. (4·16 ft.)	1·569 m. (5·14 ft.)	4·252 kilo. (9·37 lb.)	4·677 kilo. (10·3 lb.)	..	..	Uncased	200—1,800 yds. 1,600—2,900 yds. (With magazine)	7	33 calibre (10 in.)	"	Detachable box	8 cartridges in magazine, also single loading	"	77 mm. (3·03 in.)	28·3 gm. (436·7 gr.)	"	..	215 gr.	Pellet black powder. Cordite smokeless	4·5 gm. (70·0 gr.) 2·0 gm. (30·5 gr.)	564 m. (1,850 ft.) 686 m. (2,000 ft.)	2,835 atm. (18·0 tons, 15·0 tons)	(3·0)	—
5	Russia	1891 Three line rifle	Kapit Mosin.....	7·62 mm. (0·3 in.)	..	1·73 m. (5·67 ft.)	..	4·3 kilo. (9·48 lb.)	..	..	"	..	4	30 calibre (10 in.)	"	Box	Charger for 5 cartridges	"	76 mm. (2·99 in.)	23·46 gm. (362·0 gr.)	Hard lead. White metal.	30·5 mm. (1·20 in.)	13·86 gm. (214 gr.)	Smokeless (home-made)	..	610—620 m. (2,001— 2,031 ft.)	..	0·304 gm. sq. mm. (2·9)	—
6	Italy	1891	Mannlicher	6·5 mm. (0·2569 in.)	..	..	3·72 kilo. (8·2 lb.)	..	..	..	"	..	..	24 cm. = 36 calibre (9·45 in.)	"	"	Clip with 5 cartridges	"	..	21·5 gm. (331·8 gr.)	Lead. White metal.	30·5 mm. (1·2 in.)	10·5 gm. (162 gr.)	Smokeless Noble Ballistite	..	700 m. (2,296 ft.)	5,000 atm. (32·8 tons)	0·31 gm. sq. mm. (2·85)	—
7	Belgium	1889	Mauser in Oberndorf	7·65 mm. (0·3012 in.)	1·275 m. (4·18 ft.)	1·525 m. (5·0 ft.)	3·9 kilo. (8·6 lb.)	4·27 kilo. (9·41 lb.)	4·043 kilo. (8·91 lb.)	4·313 kilo. (9·52 lb.)	Cased	500—2,000 m. (547—2,187 yds.)	4	25 cm. = 33 calibre (9·84 in.)	"	"	Charger for 5 cartridges, also single loading	"	78 mm. (3·07 in.)	28·6 gm. (441·3 gr.)	Soft lead. Cupro-nickel.	30·5 mm. (1·2 in.)	14·2 gm. (219·1 gr.)	Smokeless (111') N	3·05 gm. (47·0 gr.)	610 m. (2,001 ft.)	3,000 atm. (19·7 tons)	0·309 gm. sq. mm. (2·9)	1·1 m.-kilo. (0·2253 lb. per sq. ft.)
8	Switzerland	1889	Schmidt Rubin ...	7·5 mm. (0·2952 in.)	1·302 m. (4·27 ft.)	1·6 m. (5·25 ft.)	4·3 kilo. (9·48 lb.)	..	..	..	Uncased	300—2,000 m. (328—2,187 yds.)	3	27 cm. (10·63 in.)	Straight pull with revolving bolt cylinder	"	Charger for 12 cartridges, also single loading	"	77·5 mm. (3·05 in.)	27—27·5 gm. (416·6— 424·4 gr.)	Hard lead, with steel point and paper jacket.	28·7 mm. (1·13 in.)	13·7 gm. (211·5 gr.)	Smokeless P/C 89	1·75—2 gm. (27—30·1 gr.)	600 m. (1,968 ft.)	2,600 atm. (17·1 tons)	0·31 gm. sq. mm. (2·89)	0·86 m.-kilo. (0·1761 lbs. per sq. ft.)
9	Denmark	1889	Krag Jørgensen ..	8·0 mm. (0·3149 in.)	1·33 m. (4·36 ft.)	1·59 m. (5·21 ft.)	4·250 kilo. (9·37 lb.)	4·470 kilo. (9·85 lb.)	..	..	Cased	250—1,400 m. (273—1,531 yds.)	6	30 cm. (11·8 in.)	Double	Box with door opening at side	Charger for 5 cartridges, also single loading	"	76 mm. (2·99 in.)	30 gm. (462·9 gr.)	Soft lead. Cupro-nickel.	30 mm. (1·18 in.)	15·43 gm. (238·1 gr.)	Smokeless (home-made)	2·2 gm. (33·9 gr.)	600 m. (1,968 ft.)	2,300 atm. (15·1 tons)	0·037 gm. sq. mm. (2·91)	—
10	Turkey (Spain) ...	1890	Mauser in Oberndorf	7·65 mm. (0·3012 in.)	1·235 m. (4·05 ft.)	..	4·032 kilo. (8·89 lb.)	..	..	..	Uncased	500—2,050 m. (547—2,241 yds.)	4	25 cm. = 33 calibre (9·84 in.)	"	Box	Charger for 5 cartridges, also single loading	"	78 mm. (3·07 in.)	28·6 gm. (441·3 gr.)	Hard lead. White metal.	30·7 mm. (1·21 in.)	14 gm. (216·0 gr.)	Smokeless (No. 6 P.)	2·4 gm. (37·0 gr.)	652 m. (2,139 ft.)	3,000 atm. (19·7 tons)	0·305 gm. sq. mm. (2·94)	—

In many details of construction modern military rifles present features of similarity; thus the bolt action is found throughout, and it has generally a forward and turning motion, and is provided with two locking lugs. The straight-pull bolt has met with less favour.

After 1886 the tube magazine was quite abandoned; the box magazine and clip loading have been almost universally adopted. England has, with but small success (see "Umschau," vol. lxxxii), retained the first construction of Lee.

The anomalous construction of Denmark is said not to give much satisfaction,¹ and a change to the Mauser rifle is under consideration. Cartridge holders which disengage or free the cartridges in loading, and do not enter the magazine, are the best (Belgian Mauser rifle). Barrel casings have only found partial favour; a wooden hand-guard is generally considered sufficient. The bullet cores are mostly of hard lead, the envelope of white metal, nickel steel, or copper nickel.

The powder throughout is smokeless. It is in the shape of flake powder, paper powder, guncotton powder, dice shaped (or cubical) nitro-glycerine powder, &c.

The accompanying table gives a survey of rifle statistics for the greater, and for some of the medium and smaller, European Powers, so far as data were obtainable.

September, 1892.

The period under review does not certainly present such rich materials for treatment as that recently under examination (June, 1892, vol. lxxxiii, p. 338); it has been, nevertheless, an important one, and has thrown much light on certain questions of extreme moment, especially with regard to the further diminution in the calibre of small arms.

* * * * *

With reference to the small-arm question, we announced that Italy had finally adopted the calibre of 6.5 mm. (0.2569 in.), that Roumania had practically decided upon the same calibre, and that the Netherlands had it in contemplation.

Italy produces all her small-arms in her own factories, although apparently negotiations are on foot with the Austrian Small Arms Company, at Steyr, with regard to taking over a portion. The direct communications which have reached us from Italy as to the value of the new weapon sound extremely satisfactory.

In Roumania, Parliament has voted a sum of 15 million francs to cover the introduction of the Mannlicher rifle of 6.5 mm. (0.2569 in.) calibre, in favour of which the Commission which carried out the trial of various systems of small-calibre magazine-guns pronounced unanimously and finally. It is however quite clear, that a suitable smokeless powder for the rifle has not yet been decided upon, and that it is still under investigation. The different sorts of powder from France, Belgium, and Germany have been tried, and only two

¹ *Note by Translator.*—This is at variance with the recent report of the U.S. Board.

proved in any degree satisfactory; with these two experiments are to be continued! on a larger scale, for which purpose 5,000 rifles have been ordered from the Steyr factory. These rifles are to be tried by the troops with the two smokeless powders, under active service conditions. Pending the results of these trials, the question of the rifle, as well as that of the powder, remains an open one (see remarks of the Minister of War, General Lahovary, in the Senate, as reported in the "Cologne Gazette" of June 23rd).

In the Netherlands, the Commission for experiments has completed its work, and has likewise pronounced in favour of the 6.5 mm. (0.2569 in.) Mannlicher rifle. More exhaustive experiments are to take place shortly, as soon as the purchase of the necessary number of rifles has been effected.

In Spain, the Mauser rifle of 7.65 mm. (0.3012 in.) calibre was finally accepted in July. Searching experiments in the camp of Carabanchel gave most favourable results. The ballistic results proved most astonishing, although the troops had only handled the rifle for a short time; the enthusiasm of the soldiers for it is said to be extraordinary. Field firing was carried out at a range of 2,000 m. (2,187 yds.). Russia has given a commission for the alteration of 400,000 Berdan rifles into magazine arms, to the National Small Arms Factory established in 1889 at Horstall, near Lüttich, which has already a Belgian order in hand for 150,000 rifles. The order is to be executed within two years. The alteration is to cost 15,000,000 francs. Further information about the Company formed by the Lüttich small arm manufacturers is given in the "Revue de l'Armée Belge," vol. vi, May, 1892). Turkey intends to convert her 550,000 Martini-Henry rifles of 11.3 mm. (0.4449 in.) calibre into rifles of 7.65 mm. (0.3012 in.) calibre. According to advices from Russia, tenders have been made for the work by the German firm of Mauser, by some English factories, and by a French firm; negotiations are in progress. The bore of their rifles, at present very variable, is to be brought to an uniform calibre of 7.65 mm. (0.3012 in.), which is that of the Mauser rifle, Pattern 1890.

With regard to the calibre of 6.5 mm. (0.2569 in.), we have only been able so far to give incomplete notices (see tables, vol. lxxxiii, pages 356—357).

In the May number of the "Mitteilungen über Gegenstände des Artillerie und Genie Wesens" (Vienna), however, a more complete description has been published of a repeating rifle of 6.5 mm. (0.2569 in.), constructed by Chief Engineer Mannlicher.

In the July number of the "Revue d'Artillerie" there is an article on the same subject, in which use has been made of the official publications concerning the experiments of the Technical and Administration Committee at Vienna, carried out with that rifle, and also of a description of the arm furnished by the Steyr factory. We shall follow the latter source, which also contains numerous illustrations. The constructional details of the rifle are very similar to those of the German rifle, Pattern 1888, of 7.9 mm. (0.311 in.) calibre; the Mannlicher rifle, however, has no barrel casing, but has a wooden

hand-guard instead. The four grooves have a length of twist of 20 cm. (7·87 in.) corresponding to 31 calibres. We shall pass over slight alterations in the bolt, cartridge feeding, stock, and sighting. The latter goes up to 2,500 m. (2,734 yds.), equal to an angle of departure of $9^{\circ} 16'$, with a corresponding angle of descent of $16^{\circ} 50' \cdot 5$, and time of flight of $11'' \cdot 21$. The cartridge (with rim) contains a charge of 2·35 gm. (36·26 gr.) of flake (Blättchen) powder, made by the Rhenish Westphalian Explosives Co., at Troisdorf, near Bonn; the steel or nickel enveloped bullet weighs 10·5 gm. (162 gr.), is 31·4 mm. (1·236 in.) long, with a greatest external diameter of 6·7 mm. (0·2637 in.). The cartridge is 77·7 mm. (3·058 in.) long, and weighs 22·7 gm. (350·34 gr.). The cartridge clip for five cartridges weighs about 9·5 gm. (146·6 gr.).

The Vienna Committee experimented with two rifles of different lengths and corresponding weights, using the same ammunition, which differs but slightly from that described above [cartridge 76·5 mm. (3·22 in.) long, weighing 21·9 gm. (337·96 gr.)]. The barrels of the rifles differed by 60 mm. (2·36 in.), the longer rifle with barrel being 1·285 m. (4·21 ft.), the shorter with barrel being 1·225 m. (4·02 ft.); the weights were 3·935 kilos. (8·67 lbs.), 3·845 kilos. (8·76 lbs.) respectively. The experiments dealt with:— (1) muzzle velocity, (2) ordinates of the 450 m. (492 yds.) trajectory, (3) penetration of the bullet, (4) angle of jump, (5) height of sight, (6) cone of dispersion.

For the short rifle charges of 2·1 gm. (32·4 gr.) of Ballistite and 2·6 gm. (40·1 gr.) of Austrian rifle powder, Pattern 1890, were used to obtain the velocity, at one time weighed, at the other measured. For the long rifle only weighed charges of the Austrian powder were used. The weighed charges gave the more regular results, the Austrian powder varying less than the Ballistite. The velocities of the long and short rifles differed inappreciably. For an observed velocity at 25 m. (27·3 yds.) of 705 m. (2,313 ft.-sec.), the muzzle velocity was estimated to be 730 m. (2,395 ft.-sec.). The highest ordinate of the 450 m. (492 yds.) trajectory was 81·5 cm. (2·67 ft.) at 262·5 m. (287 yds.). The steel envelope bullet penetrated close to the muzzle 69 cm. (27·16 in.) red beech wood, as compared with a penetration of 50 cm. (19·68 in.) to 56 cm. (22·04 in.) with the 8 mm. (0·3149 in.) rifle. 15 cm. (5·9 in.) of fir were penetrated at 1,500 m. (1,640 yds.); the penetration at 2,500 m. (2,734 yds.) still amounted to 11 cm. (4·3 in.); the angle of jump was +13 minutes in the long, and +14·5 minutes in the short rifle.

The following tables, which are included in the article above mentioned, give some interesting ballistic data:—

Range in metres and yards.	Angle of departure.			Angle of descent.			Time of flight in seconds.	Remaining velocity in metres and f.s.	Dangerous space for an object 1 m. (3·28 ft.) in height fired at from a rest at the height above the ground of		Probable double deviation in metres and feet.	
	°	'	"	°	'	"			1·5 m. (4·9 ft.)	0 m. (0 ft.)	Vertical.	Horiz-ontal.
100 m. (109·3 yd.)	0	4	0	0	4	50	0·14	650 m. (2132·58 f.s.)	135 m. 442·9 ft.	..	0·03 m. (0·098 ft.)	0·02 m. (0·066 ft.)
500 m. (546·8 yd.)	0	25	10	0	34	40	0·90	445 m. (1,460 f.s.)	80 m. 262·4 ft.	..	0·21 m. (0·689 ft.)	0·12 m. (0·623 ft.)
1,000 m. (1,093·6 yd.)	1	11	30	1	51	20	2·36	330 m. (1,082·7 f.s.)	..	31 m. (101·7 ft.)	0·66 m. (2·16 ft.)	0·52 m. (1·7 ft.)
1,500 m. (1,640·4 yd.)	2	46	40	4	44	40	4·56	282 m. (925·2 f.s.)	..	12 m. (39·37 ft.)	1·40 m. (4·59 ft.)	1·34 m. (4·39 ft.)
2,000 m. (2,187·2 yd.)	5	23	20	9	39	20	7·51	202 m. (666·7 f.s.)	..	5·5 m. (18·04 ft.)	4·20 m. (13·78 ft.)	3·40 m. (11·15 ft.)
2,500 m. (2,734 yd.)	9	16	0	16	50	30	11·21	174 m. (570·88 f.s.)	..	3 m. (9·84 ft.)	16·00 m. (52·49 ft.)	8·00 m. (26·24 ft.)

Range in metres and yards.	Ordinates in metres and yards at half the range.		Co-ordinates of the "culminating point" of the trajectory in metres and yards.		
	6·5 mm. (0·2569 in.) rifle.	German rifle Pattern '88. (0·311 in.)	Sighting for a range of metres and yards.	Abscissæ.	Ordinates.
500 m. (546·8 yds.)	1·04 m. (1·138 yds.)	1·50 m. (1·64 yds.)	1,200 m. (1,312 yds.)	710 m. (776·4 yds.)	12·70 m. (13·88 yds.)
600 m. (656·1 yds.)	1·65 m. (1·80 yds.)	2·50 m. (2·73 yds.)	1,400 m. (1,531 yds.)	820 m. (897·7 yds.)	21·88 m. (23·92 yds.)
800 m. (874·9 yds.)	3·53 m. (3·86 yds.)	5·40 m. (5·90 yds.)	1,600 m. (1,750 yds.)	940 m. (1,028 yds.)	35·37 m. (38·67 yds.)
1,000 m. (1,093·6 yds.)	6·74 m. (7·37 yds.)	10·01 m. (10·94 yds.)	1,800 m. (1,968 yds.)	1,070 m. (1,176 yds.)	53·56 m. (58·57 yds.)
			2,000 m. (2,187·2 yds.)	1,210 m. (1,323 yds.)	77·20 m. (84·40 yds.)
			2,500 m. (2,734 yds.)	1,500 m. (1,640 yds.)	165·90 m. (181·43 yds.)

On comparing it with the German rifle, Pattern 1888, to which an equally great rapidity of fire is ascribed, the author points out, how in the 6·5 mm. (0·2569 in.) rifle the filled clip only weighs 120 gm. (1,852 gr.), and is therefore 25 gm. (385·8 gr.) lighter than that of the rifle Pattern 1888, so that it allows of an increase in one-quarter of the amount of ammunition which can be carried without an increase of weight.

The flatness of the trajectory, with 730 m. (2,395 ft.-sec.) velocity as against 630 m. (2,066·9 ft.-sec.), is appreciably increased, as the following table shows:—

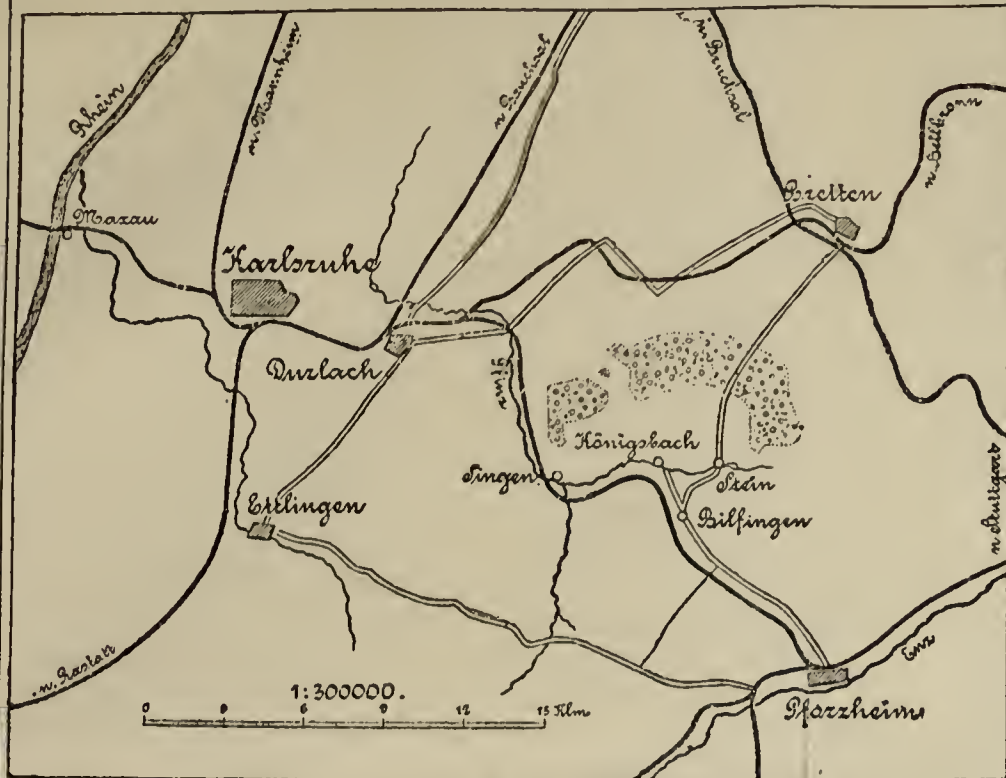
Height of firing rest in metres and feet.	Height of target in metres and feet.	Maximum dangerous space in metres and yards.
1·5 m. (standing) (4·921 ft.) ,,	1·8 m. (infantry standing) (5·9 ft.) ,, 2·7 m. (cavalry) (8·85 ft.) ,,	500·0 m. (546·8 yds.) 645·0 m. (704·4 yds.)
0·4 m. (lying down) (1·312 ft.) ,,	1·8 m. (infantry standing) (5·9 ft.) ,, 2·7 m. (cavalry) (8·85 ft.) ,,	600·0 m. (656·2 yds.) 720·0 m. (787·4 yds.)

In the small-calibre rifle accuracy is appreciably greater, and, without laying much stress upon it, the recoil is slighter. It has been calculated that its power of penetration, even at a range of 2,000 m. (2,187·2 yd.), is superior to that of the Lebel rifle.

In conclusion, the author mentions the further diminution of the calibre to 5 mm. (0·197 in.) on the strength of Hebler's remarks (see vol. lxxxiii, p. 354).

Meanwhile, certain interesting experiments made in France with a new repeating rifle of 6·5 mm. (0·2569 in.) have been concluded. The "France Militaire" of 31st May has a notice of it. Its small weight, its simplicity, the solidity of its mechanism, the very considerable velocity, and the lightness of the ammunition—weight of cartridge 20 gm. (308·6 gr.) as compared with the 29 gm. (447·5 gr.) Lebel cartridge—are mentioned as so many advantages. Seeing that the French Lebel rifle must be considered inferior to those of all foreign Powers, owing to its method of loading, we may assume that the authorities are more and more inclining to the idea of a new armament in spite of the excellent ballistic qualities of the present one. The decision will be hastened by Italy's adoption of the smaller calibre which, on its completion, will prove essentially superior to the French rifle even in its ballistics. At all events, we may assume that in the course of the next few years some radical changes in rifle armament will be made.

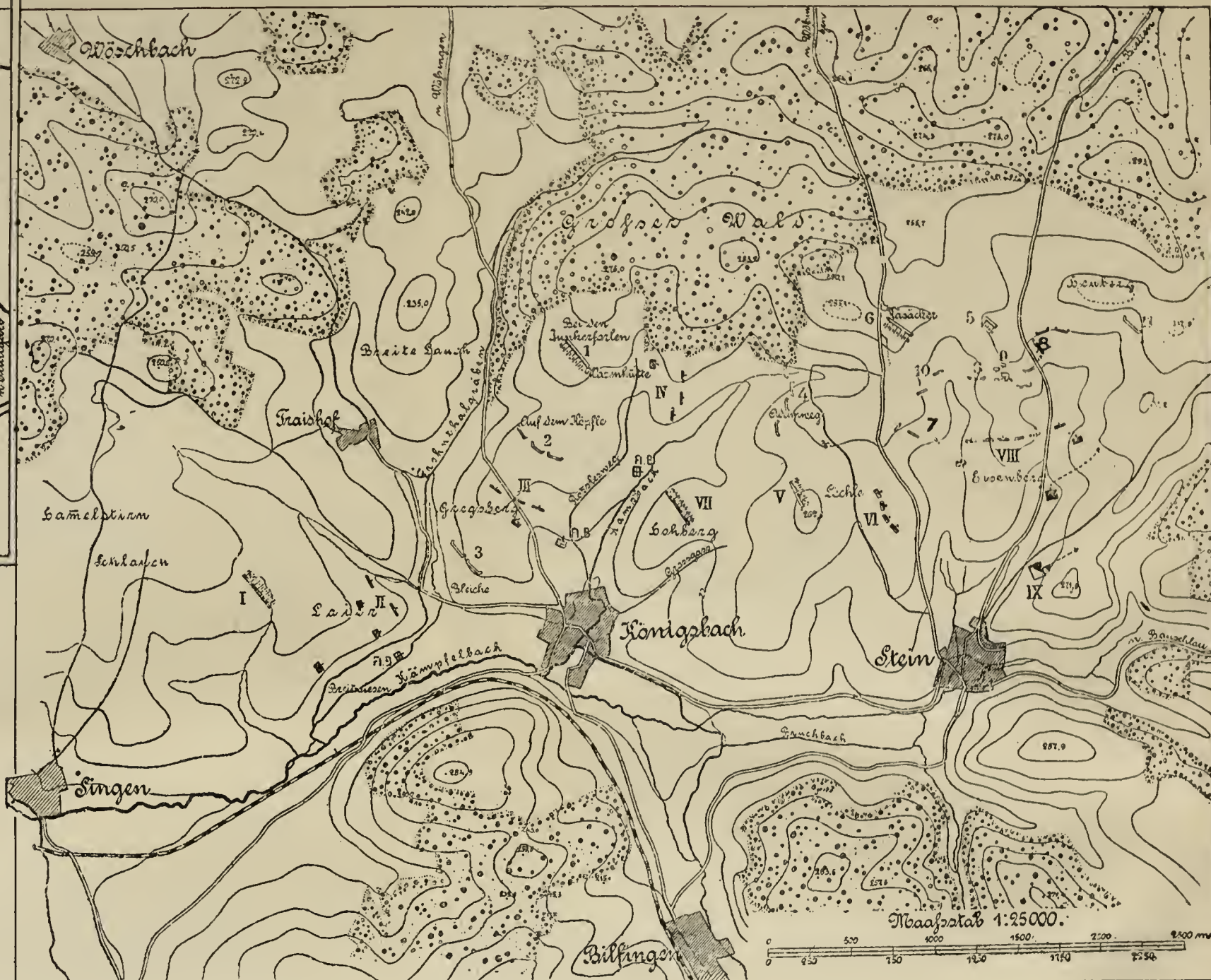
SKETCH TO ILLUSTRATE GENERAL IDEA.



POSITIONS OF THE TROOPS
FOR PLAN OF GROUND FOR FIELD FIRING.

- I.—1st Brig. Div. 14th Arty., 1st position.
- II. } 3rd Battn. 111th Regt., 1st, 2nd, and 3rd positions.
- III. }
- IV. }
- V.—II.A. Brig. Div., 14th Arty.
- VI.—20th Dragoons, fighting dismounted.
- VII.—1st Brig. Div. 14th Arty., 2nd position.
- VIII.—109th Grenadiers.
- IX.—20th Dragoons.

PLAN OF GROUND FOR FIELD FIRING.

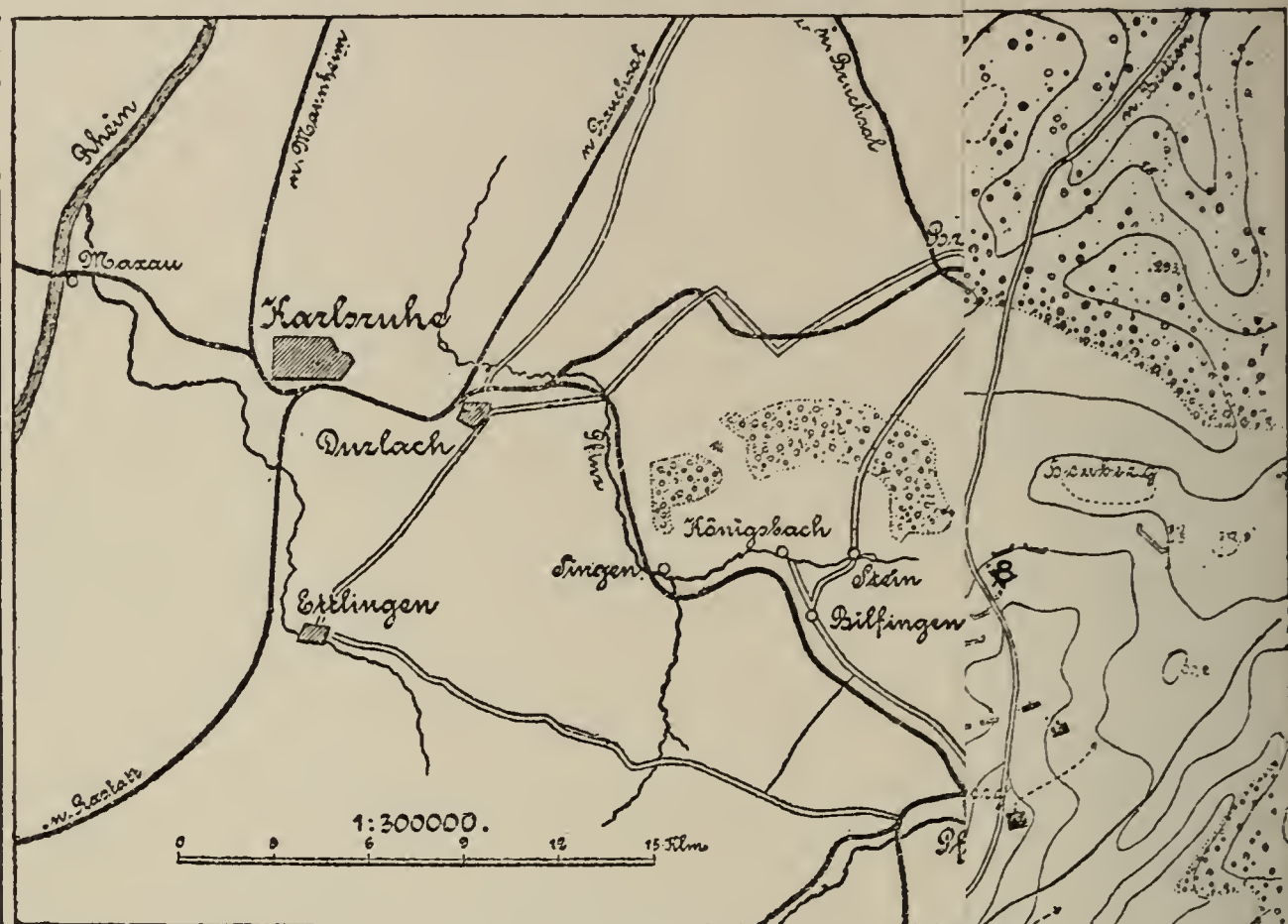


DETAIL OF THE TARGETS FOR PLAN OF GROUND FOR FIELD FIRING.

- | | |
|---|--|
| 1.—18 guns, 9 amm. wagons, 144 figures, 8 mounted men. | 8.—450 head, head and shoulders, head and body, and head to knee targets, 50 full figures, 2 supports of 10 squad targets, 1 mounted man, and 254 head, head and shoulders, head and body, and head to knee targets. |
| 2.—382 head, head and shoulders, and head and body figures, 4 squad targets, 1 mounted man. | 9.—In an enclosure, 200 head, head and shoulders, and head and body targets; behind a hedge in front of it, 100 full figures. |
| 3.—211 head, head and shoulders, and head and body figures. | 10.—180 full figures. |
| 4.—400 Do. do. do. | 11.—200 head figures. |
| 5.—6 guns, 3 amm. wagons, 38 figures, 2 mounted men. | |
| 6.—12 guns, 6 amm. wagons, 76 figures, 6 mounted men. | |
| 7.—350 head and shoulders and full figures, 4 squad targets. | |

Fl.-B.—Flag-Battalion (marked).

SKETCH TO ILLUSTRATE GENERAL I



POSITIONS OF THE TROOPS
FOR PLAN OF GROUND FOR FIELD F

- I.—1st Brig. Div. 14th Arty., 1st position.
- II. }
- III. } 3rd Battn. 111th Regt., 1st, 2nd, and 3rd pos
- IV. }
- V.—H.A. Brig. Div., 14th Arty.
- VI.—20th Dragoons, fighting dismounted.
- VII.—1st Brig. Div. 14th Arty., 2nd position.
- VIII.—109th Grenadiers.
- IX.—20th Dragoons.



DE

- 1.—18 guns, 9 amm. wagons, 144 figures, 8 mountengets, 50 full
- 2.—382 head, head and shoulders, and head an 54 head, head
1 mounted man.
- 3.—211 head, head and shoulders, and head and bobody targets ;
- 4.—400 Do. do. do.
- 5.—6 guns, 3 amm. wagons, 38 figures, 2 mounted
- 6.—12 guns, 6 amm. wagons, 76 figures, 6 mounted
- 7.—350 head and shoulders and full figures, 4 squa

A FIELD FIRING EXERCISE WITH ALL ARMS COMBINED IN THE XIVTH GERMAN ARMY CORPS.

Translated from Nos. 89 and 90, of 1892, of the "Militär Wochenblatt" by Captain J. M. GRIERSON, R.A., D.A.A.G.

ON the 16th August there was carried out, under the personal direction of the General Officer Commanding the XIVth Army Corps, a field firing exercise on a large scale, with all arms combined, in the foot-hills of the Black Forest, between Karlsruhe and Pforzheim.

The ground chosen for the exercise lies half-way between Durlach and Pforzheim, at Königsbach, on the northern slope of the Kämpfelbach valley, the latter stream from Stein to Singen bounding it on the south. From the Kämpfelbach the ground rises in easy rolling slopes for 2,200 to 3,300 yards to the edge of a belt of wood, which is about 500 feet above the stream and is broken at the "Breite Lauch" by a broad clearing.

The belt of wood in the north and the deeply-cut gullies on the east at Stein, on the south along the Kämpfelbach, and on the west along the Pfinzbach, facilitated the keeping clear of the ground, a duty which was performed mostly by the cavalry.

The lesser half only of this ground is cultivated; of the cultivation, the tobacco fields were considered as impassable, and broad tracks were cut through those of ripe corn, while free passage was permitted over fields with root crops, stubble fields, and newly-ploughed ground. There were few fruit trees, and only one small building (a bleaching establishment) lay within the line of fire, which latter was evacuated by its inhabitants on condition of all damage being paid for.

The ground was everywhere passable for troops, but in places the steep slopes of gullies and hollows offered some difficulties to movement.

The above description of the ground is of importance, for it shows that, even in such a highly cultivated country as Baden, suitable ground for such exercises can always be found, and that, too, where the actual and probable damages to crops are so small as to be out of all comparison with the instruction gained by the troops.

On this ground, the movements of the troops, which were considered as forming part of a larger force, took place in the general direction of from Singen to the Heuberg, *i.e.*, from S.S.W. to N.N.E., so that the belt of wood and the high Heuberg materially contributed to the safety of the localities lying behind them. The weather was clear and cloudless, and the sun was very powerful.

Four battalions, four squadrons, and five batteries, from Karlsruhe and Durlach, took part in the exercise. The infantry was so formed that each company of the peace establishment represented only one

section (*Zug*) on the war establishment, the remaining two sections of each company being only marked by flags and by a few men. The cavalry was in four squadrons on the war strength, and each battery had with it its first line of ammunition wagons.

The following was the general idea:—

An Eastern Corps on the march from Bretten on Karlsruhe finds itself opposed by a Western Corps, advancing from the line Karlsruhe-Ettlingen, and takes up a position on the wood clearing (*Breite Lauch*), its left wing (targets) to the south of the woods, facing *Königsbach*. The right wing of the Western Corps advances by *Singen*; a strong right flank detachment has been pushed forward on *Pforzheim* in the *Enz* valley.

At the beginning of the exercise, the following was supposed to be the situation:—

The main bodies of the opposing artilleries are in action against one another across the *Traishof* valley, those of the Eastern Corps on the *Breite Lauch*, those of the Western on the *Hammelstirn* and *Schlauch*. The infantry is hotly engaged at the *Traishof* and to the north of it. Several Eastern batteries (Target No. 1) at the *Junkerforten* and advanced infantry detachments on the *Köpfl* and *Gregsberg* (Targets 2 and 3), to the north of *Königsbach*, form the left wing of the Eastern Corps.

Under this idea and its development, which led to, for the Western Corps, an outflanking and turning movement by *Königsbach* and *Stein*, and, for the Eastern Corps, to a movement fighting in retreat through the *Grosser Wald* and a rear-guard position on the *Heuberg*, the troops were assembled at 10 A.M. at the points from which they were to reach the boundaries of the ground. The rendezvous places, to which the troops marched straight from their garrisons on the morning of the 16th August, were:—

1st Brigade-Division, 14th Artillery	} north of Singen.
3rd Battalion, 111th Regiment	
20th Body Guard Dragoon Regiment	} north of Königsbach.
Horse Brigade-Division, 14th Artillery	
109th Body Guard Grenadier Regiment, north of Stein.	

Immediately before going into action, each unit received a short notice of the situation so far as it was concerned, and orders as to what it had to do.

The following was the course of the action:—

The 1st Brigade-Division, 14th Artillery, received, after its arrival to the north of *Singen*, at 10 A.M., orders to come into action as the right wing of the supposed artillery position between *Schlauch* and *Laier*, and to engage the hostile artillery at the *Junkerforten* (Target No. 1), while the 3rd Battalion 111th Regiment covered it on its right. The latter took position at *Breitwiesen*, pushing one company along the slope towards the *Gregsberg* (Target No. 3) and patrols up that hill.

In the advance to, and occupation of, the position (I) which had been reconnoitred by the Commander of the brigade-division, the

measures laid down in paras. 282 to 290¹ of the new "Artillery Drill Regulations" were practised, but the batteries opened fire simultaneously, without taking up a covered preparatory position (para. 290).

The hostile batteries, which were in position on a slope falling towards I/14th, were partly overshadowed by large fruit trees, so that, in spite of the generally prevailing good light and the dust caused by the shells striking, the observation of the fire was not easy. Still, each battery soon picked up its allotted target (paras. 305 and 308²); the range was, after a few rounds of common shell, fixed at 2,350 m., and shrapnel fire was at once opened. The results were excellent, as appeared later on, and only a few guns which lay in deep shadow escaped comparatively easily. Each battery (fifty-nine targets each) showed from 81 to 215 hits.³

During this artillery fight, the 3rd Battalion 111th Regiment had opened fire against the hostile shooting lines on the Gregsberg, and had pushed forward a second company. Fire was opened at first at a range of 700 m., across a broad low-lying meadow, but soon the shooting lines were pushed on to ranges of 600 and 550 m. From the top of the Laier it was easy to see that the correct ranges were very quickly found, for the bullets striking raised distinctly-visible cloudlets of dust, the thickest of which, *i.e.*, the centre of the cone of dispersion, lay close in front and in rear of the targets, and only comparatively few bullets flew wide; good results were consequently to be expected here, and the expectation was justified later on, as the 211 low targets showed 510 hits.

The effect of this fire was judged to be so good that the General Commanding ordered the battalion to drive the hostile infantry off the Gregsberg, and to advance to the attack of that on the Köpfle (Target No. 2); the latter were fired upon by one of the batteries ("Artillery Drill Regulations," para. 308 (6)) to prepare the attack, as it was assumed that the I/14th had got the ascendancy over the fire of the hostile artillery. This battery had, therefore, to change its target and find its range anew, and the former target (artillery) had to be re-divided among the other two batteries. It was not so easy to pick up the range against the infantry as it had been against the artillery, as the hostile shooting line was cleverly concealed behind a green bank and a corn-field, so that the formation of the short bracket was difficult. When the range had been ascertained to be 1,850 m., shrapnel fire was begun. 145 hits were made on the 110 lying-down and kneeling figure targets.

A battalion marked by flags was now brought up into line on the

¹ These refer to reconnaissance of the enemy and the ground, utilization of cover in approach, pace of approach, coming into action under cover, distribution of positions and targets, bringing up of the batteries, speed in opening fire, placing of guns, and preparatory positions.—J. M. G.

² Para. 305 lays down that the Commander of the troops points out the target, and the artillery Commander divides it among his command. Para. 308 refers to the conduct of the fire of a brigade division.—J. M. G.

³ The number of rounds fired is in no case stated.—J. M. G.

right of the III/111th, and carried the latter along with it to the attack. The advance was made by rushes, as the attackers were supposed to be under hostile fire, and the ground offered no cover. Soon the right wing of the shooting line, as it crossed the meadow land near the bleaching establishment, where it was partly also covered by the houses of the latter, got into a dead angle, where it could collect under cover for the final rush. The left wing of the shooting line on the slope of the Laier, which was on about the same level as the hostile skirmishers, advanced by rushes to about 300 m. from them, and then halted to cover the advance of the right wing by its fire. The charge was not carried out, as it was assumed that the enemy had retired, and only half a section was sent forward to pursue him.

At first each arm, though both were working together with the same object, had its own target to fire at, but now both turned their fire on to Target No. 2, and the III/111th entered upon the second phase of the task assigned to it, a portion of the artillery preparing its advance by its fire. The battalion was ordered to seek connection with the (supposed) infantry engaged on its left, the flank of which was marked, while the flag battalion advanced simultaneously on its right. It was re-formed in the position captured from the enemy on the Gregsberg, two companies being kept back in second line. The half section which had been pushed forward in pursuit opened fire at 600 m. against Target No. 2, and was at once reinforced by the remainder of the first line, a third company being also brought up from the second line to strengthen the first.

Favoured by the ground, the shooting line was able to advance to about 450 m. from the enemy, and there opened a steady, well-aimed fire (III). To prevent accidents, as the infantry advanced to close ranges, signals were passed to the artillery, by waving a blue flag, to cease firing. When it was assumed that the fire of the attackers had got the better of that of the enemy, the battalion advanced by rushes to about 200 m. from the position (Target No. 2) on which, until ordered to cease firing, the artillery had been playing, but here again the final attack was not carried out, as it was assumed that the troops of the Western Corps had captured the Breite Lauch, and were pursuing the enemy through the Grosser Wald, thereby forcing the hostile batteries at the Junkerforten (Target No. 1) and the infantry covering them on the Köpfle (Target No. 2) to withdraw with all speed, pursued by the fire of the battalion. In the 272 targets in the position (No. 2), 303 hits were counted.

It was assumed that a hot fight was raging in the Grosser Wald, and that it had come to a standstill to the north of Wasenhütte, and the battalion advanced across the Rösselsweg to about the same level, where it was received by a heavy fire from the north-east corner of the wood and the Adamsweg (Target No. 4), and had to halt and take up the fire-fight (IV). The flag battalion on its right had advanced over the Köpfle, and now took up a position écheloned back on the right of the III/111th.

In the meantime, the detachment which had been pushed towards

Pforzheim was supposed to have been attracted by the sound of the firing from Königsbach, and to have advanced by Bilfingen. Its Commander was supposed to have hastened forward with four squadrons and the Horse Brigade-Division, and, on arrival at Königsbach, to have received orders to advance through the Grossgass and over the Löchle, to pursue the enemy retiring on the Heuberg. On reaching the height to the west of the Löchle, shells from hostile artillery on the slope of the Heuberg along the road from Stein to Bretten (Target No. 5) were supposed to fall among the column, and, at the same time, patrols (supposed) reported that Stein had, a quarter of an hour before, been evacuated by hostile infantry, which had withdrawn in a northerly direction, and that the Heuberg appeared to be occupied by the enemy.

The Horse Brigade-Division at once came into action (V) on the height west of the Löchle against the hostile battery on the Heuberg, but immediately on opening fire it was also fired upon by two batteries of the enemy's artillery (Target No. 6) which had come into action on the Käsäcker. It was hard to make them out, as they had apparently taken position in rear of a thick and high hedge, and therefore it was extremely difficult to find their range. A portion of the brigade-division, which was only two batteries strong, had to change to this new target ("Artillery Drill," para. 308 (2)). Thus the artillery and cavalry were now in an extremely precarious position. Surprised by hostile fire on reaching the top of the hill in its movement of pursuit, the brigade-division had been forced to come quickly into action, in the hope of soon getting rid of its weaker antagonist, when it had been suddenly fired into by an equally strong force of hostile artillery, and the concentric fire of those two groups must be superior to its own. While one battery took up on even terms the combat against Target No. 5, the other had to oppose the second group of the enemy, according to the instructions of the "Artillery Drill," which lays down the principle that no portion of the enemy's artillery should be left wholly unengaged.

The cavalry regiment had at first formed up in a hollow to the right front of the guns, to protect them against the infantry which had been reported as retiring from Stein, but when further (supposed) news was received that the heights north of the Eisenberg were occupied by thick lines of skirmishers (Target No. 8), and that a farmstead on the western slope of the Heuberg (Target No. 9) was held, the Dragoon Regiment received orders to dismount and occupy the height in front of it (VI). Hardly had this position been taken up by all four squadrons, the ground being very cleverly utilized, when the advance of hostile shooting lines against their left flank across the hollow running down from the Käsäcker was reported (Target No. 7, some of the targets of which were made to appear and disappear). The attacking infantry was concealed from the artillery by the configuration of the ground, otherwise the latter, according to para. 330 (1) of the "Artillery Drill," would have turned the fire of a portion of its guns upon it without heeding the hostile artillery, so the cavalry had to meet the attack single-handed. Thus the task of

the dragoons was not, as is usually the case with cavalry, the mere preliminary stage of a fight, but was a phase of a larger action in close connection with the other arms. The front taken up by the hostile infantry reported between the Eisenberg and the Heuberg, and the direction of its attack, forced the dragoons to fire half-left, as it was impossible to form a new front facing the enemy from the supports. They therefore opened a heavy quick fire at 500 m., while several sections fired volleys at the closed bodies of the enemy, and, when the latter was supposed to have been checked by this fire and to have halted to return it, the whole changed over to steady individual fire. The results were apparently good.

It was assumed that the 109th Grenadiers, who were following the dragoons and artillery, had, on arrival at Bilfingen, learned that Stein had been abandoned by the enemy, and had been ordered to move on that village. On reaching it, the situation was explained to its commanders, and orders were given for the regiment to advance to the attack along the Stein-Bretten road. The approach of the Grenadiers was supposed to cause the withdrawal of the infantry which had attacked the 20th Dragoons. This movement was made by the successive appearance and disappearance in retreat of the various targets, and caused the dragoons to reopen a heavy fire.

The cavalry regiment then awaited the development and further advance of the Grenadiers, remaining dismounted as escort to the guns until its services were no longer required, when it remounted, and, on its Commander's own initiative, moved round the rear of the 109th, and prepared to cover the right flank of the line of battle, as was required by the tactical situation. It did not again come into action.

In the meantime, the situation of the artillery to the west of the Löchle had ceased to be difficult, as, when the enemy had been driven from the Junkerforten and the Köpfe, and a stationary fire-action had been entered upon between the III/111th and the infantry along the Adamsweg, the 1st Brigade-Division 14th Artillery had received orders to support the horse artillery, and advance to the Hchberg, north-east of Königsbach, with a view to engaging the guns on the Käsäcker (Target No. 6). The Brigade Division came into action in the same methodical manner as it had done on the Laier, and opened fire (VII) on the enemy's guns with all three batteries simultaneously, one battery being directed on one of the enemy's, while the two others engaged the other. The observation of the fire against the hidden target was not easy at first, and the auxiliary observers ("Artillery Drill," para. 308 (5)¹) reported that most of the rounds were short. On the two batteries of Target No. 6, 253 and 318 hits were counted respectively.

The horse artillery could now turn the fire of both batteries on to Target No. 5, and was in a short time assumed to have put it out of action. It was then, therefore, able to prepare the attack of the Grenadiers by firing on the hostile infantry (Targets Nos. 8 and 9).

¹ Parties sent out to a flank and provided with mounted men to carry reports to the battery.—J. M. G.

Thus this brigade-division had in the various phases of the fight, and even under difficult circumstances, opportunity of practising change of object and distribution of fire, until at last it combined with the infantry in firing against the same target—an extensive and strong infantry position—to prepare for the decisive attack, while the other brigade division engaged the hostile artillery (“Artillery Drill,” para. 322). 96 hits from artillery projectiles were counted on the 59 figures, &c., of No. 5 Target (a battery).

The central point of the position was an enclosure with a high barn, a dwelling-house, and a stable, partly surrounded by a boarded paling, and partly (in front) by a natural hedge. This was strongly occupied by skirmishers, and other bodies were placed in favourable positions of the ground in rear of both its flanks, thus avoiding the disadvantage of parties sent to turn the flanks of such a position having nothing to fire at, as only the edges of the targets are turned towards them. This écheloning back of the targets also permitted of the general line of fire being adhered to.

The horse artillery soon obtained the exact range by common shell and changed to shrapnel, the fire, according to para. 306 (3) and (4), being so distributed that all parts of the enemy's shooting line were kept engaged. The results showed 39 hits in Target No. 8 (300 lying-down and kneeling figures), 38 in Target No. 9 (200 various figures), and 1,128 hits on the farmstead. The want of common shell prevented the effect of artillery against an occupied enclosure and occupied shelter trenches being fully demonstrated.

The Grenadier Regiment, advancing from Stein, now occupied the Eisenberg and the hollows near it with weak shooting lines, followed by two battalions alongside of one another, while the 3rd battalion followed in rear of the right wing as a reserve. After the hostile position had been reconnoitred, the two leading battalions formed for attack, at about 1,600 m., under cover of the hill, each with three companies in front line, and skirmishers thrown out from each, the supports following at a considerable distance behind the ridge of the hill, and thus concealed from the view of the enemy. The second line companies were écheloned on the outer flanks, the third battalions remained at first in rear of the right flank, also under cover of the ridge, and the dragoons covered the right of the force (X). The regiment was thus formed on a front and depth corresponding to the configuration of the ground, and its strong shooting lines pushed forward, carefully keeping touch along the front.

Fire was opened between 600 and 700 m., and the shooting lines, after being reinforced, advanced by rushes to close range, about 500 m. from the hostile position (VIII), using the large and small terraces on both slopes of the ridge, as well as bushes and hedges, to cover their movements. In such an advance it could not be avoided that men deep down in the hollows fired high, and consequently produced little effect. From the first, the left wing of the shooting line was able to support the horse artillery in its engagement with the hostile battery (Target No. 5), and with this view the second line company on the left wing was also brought up.

When the enemy's fire was assumed to have slackened, and the shooting line therefore began to advance closer on to his position, a flank attack was represented by Target No. 10 (180 movable figures). The pause necessary to repulse this attack delayed the left wing of the shooting line, while the other portions of it pushed on to 300 m. from the position. In the meantime, assuming that he had got the upper hand of the fire from the enemy's position, the Commander of the Grenadier Regiment had pushed forward his 3rd battalion, hitherto kept in reserve, across the Stein-Bretten road, to outflank the enemy and carry out the final attack. When this manœuvre was going on, a hitherto concealed enemy (Target No. 11, 200 head targets were turned up) made an attack on the right flank of the battalion, which had to form a new front from its supports, to meet this advance by rapid fire.

After this attack had been repulsed, the storming of the position had to be carried out, and to prevent accidents all firing was stopped by pre-arranged signals. This was effected in a very few seconds, and the shooting lines were carried forward by the closed supports being brought up into them, only the 3rd battalion containing companies in reserve.

In the meantime the artillery had received orders to limber up and advance to support the infantry attack, but by special directions these orders were not carried out in their entirety. The cavalry was held ready to pursue. After the farmstead (9) and the infantry positions near it (8) had been taken, it was assumed that the enemy was also in full retreat from the Adamsweg and Käsäcker, and the order for the pursuit was given, upon which the Dragoon Regiment pushed forward round the right flank.

At about 1.30 p.m. the exercise came to an end. The Grenadier Regiment had made 2,030 hits against Target No. 8 (735 figures), 957 against No. 9 (300 figures in the enclosure and behind hedges), 1,831 against No. 10 (180 figures), and 746 against No. 11 (200 figures).

From the above account of this field firing exercise with all arms on a large scale, it will be seen that the ground was admirably chosen to meet all requirements, and that by this choice the difficulties of exterior security and of closing the approaches were got over, while interior security was attained by the arrangement of the exercise without interfering with its tactical development. Special pains were taken with the making up and arrangement of the targets, for which certainly a tactical idea had been given, but which were placed with due regard to the configuration of the ground, and in positions which took every advantage of its features.

As regards utilization of the ground, grouping and development of the troops, and employment of the different descriptions of fire, the exercise offered to all arms a number of varying tactical situations which, when taken together, gave each single phase of the action its own importance, both as an episode by itself, and as a part of the whole, and thus a fairly accurate picture of a real action was presented.

The exercise was so carried out that the various arms came successively into action, while at times all worked together. The ground permitted of the artillery continuing its fire until the infantry had approached comparatively close to the objects it was engaged against, and could open an effective small-arm fire upon them, and this was mainly attained by the circumstances that towards north and east there was a completely free line of fire, and that the infantry could advance in safety across and along the deep hollows, and approach the targets from the flank. Targets Nos. 2, 8, and 9 could for a long time be kept under both artillery and infantry fire, and at the farmstead (No. 9) the preparatory action of the artillery before the final attack was carried out was clearly shown to the infantry.

Compared with former exercises, the supply of ammunition to the troops was on a much more liberal scale, which permitted of the various episodes being made of longer duration, and more like those of real warfare. The infantry, which carried about 90 rounds per man, had still some ammunition left at the close of the action, but the artillery, which carried only 20 rounds per gun, had by that time begun to run very short, so that its co-operation with the other arms could not be as fully demonstrated as was desired, and as was one of the main objects of the exercise.

The composition of the infantry differed materially from that adopted at previous exercises, for which, as a rule, battalions on war strength had been formed. The latter plan, however, is not good if it is desired that all men of the force shall have an opportunity of firing. As there are no losses in peace, when the last supports are brought into the shooting line, the latter becomes so crowded that either the regulation front is exceeded, or the men get into dangerously thick masses. By the formation adopted, however, these disadvantages were avoided, and it was possible to let every man take his full share in the benefits of the exercise. A further advantage was that the phases of the fight could be more varied, thus allowing of each company being placed in several situations in which various principles of fire-tactics and leading could be exemplified. The simplicity of the special idea permitted also of each subordinate leader thoroughly grasping the plans of the Commander, and carrying out his task according to the situation in which he was placed with a completely free hand as regards the utilization of the ground, the formation of his command, and the control of his fire. In this freedom of action lay the main value and the great lesson of the exercise, not only for those taking part in it, but also for the spectators. The superior Officers attached to each unit as Umpires with a view to preventing accidents had never occasion to interfere in any way, and everything went off in a natural manner, and as it would happen in war.

The day of Königsbach will mark a stride forward in our method of training for war.

RECENT WORKS BY CAPTAIN HOENIG.¹

(With Map.)

By Captain W. WESTERN, R. W. Kent Regiment.

THERE is something positively refreshing in Captain Hoenig's writings. Whether one agrees with his conclusions or not—even when he would appear to have been misinformed as to his facts—the conscientious labour of the writer, combined with his absolute independence, give a charm to his writings which is usually wanting in so many of the German military writers of the present day. Captain Hoenig, at least, does not belong to the cult of the “jumping cat.” He has his opinions, and he is sufficiently independent to express them. Captain Hoenig's first book consists of two parts. The first part deals with the strategy of the 17th and 18th August, 1870; the second mainly with the tactics of the VIIth, VIIIth, and IInd German Army Corps.

The second work under review is a pamphlet issued in reply to the various strictures made by certain German military papers on the first work.

The third work is a full account of the capture of the quarries south of Point-du-Jour by the 35th Regiment, and contains information which Captain Hoenig was not possessed of when he wrote the “Twenty-four Hours.”

We propose dealing with the strategy and tactics of those eventful days in the order adopted by Captain Hoenig.

The reasons given for a thorough discussion of Von Moltke's strategy appear to us so sound that they are reproduced verbatim: “A superficial acquaintance with men of judgment, and with military literature, would lead one to suppose that the 17th and 18th August formed a dark spot in the life of Field-Marshal Von Moltke, and formed several dark spots in the lives of others; that consequently it would be better not to dwell on any of their various sins of commission and omission. ‘It is an ill bird that fouls its own nest;’ one should have some consideration towards men who deserve well of their countrymen; it would be unpatriotic and would show a want of tact to discuss matters which would bring unpleasant recollections to one person or another. Such are the arguments most

¹ “Twenty-four Hours of Moltke's Strategy, developed and explained in connection with the Battles of Gravelotte and of St. Privat, on the 18th August, 1870. First complete description of the fighting of the First Army at the Mance Ravine.” By Fritz Hoenig. With two maps. Luckhardt, Berlin, 1891.

“The Royal Headquarters and Army Headquarters on the 17th and 18th August, 1870.” By Fritz Hoenig. With a sketch map, Second Edition. Luckhardt, Berlin, 1892.

“The Fighting near the Quarries of Rozerieulles at the Battle of Gravelotte on the 18th August, 1870.” By Fritz Hoenig. With a map. Second Edition. Luckhardt, Berlin, 1892.

commonly in vogue. As far as consideration and tact are concerned, there should hardly be a difference of opinion nowadays, since Moltke himself has been induced to leave behind him a history of the war of 1870-71. The history was written in order to correct many of the errors of the Official History, which, as we know, was written with tact and consideration."

The reluctance to discuss publicly the events of the 17th and 18th August is patent in our military literature. The cause of this reluctance lies less in a lack of judgment, and of knowledge of the actors, but is due rather to a feeling of consideration for the persons concerned. Though these considerations were and are unsound and unfounded they were still, to a certain extent, comprehensible, owing to the then ruling spirit of the age; for, after all, man is but a slave to that spirit!

A thorough study of these days will, however, cause one to quickly recognize that this was no dark spot in Moltke's life, that though these days were more full of cares and worries than any others, they were also the most glorious in the campaigning life of the Chief of the General Staff. Moltke had to combat various difficulties and different people's sensibilities, he had to spare the peculiarities and authority of undoubtedly deserving men, who did not always understand the Field-Marshal; at the same time he felt it both desirable and necessary that nothing should occur to annoy his Royal Chief, and thereby cause a more serious conflict, at the very moment when the operations were ripening towards a tactical decision. By the 18th of August the feeling of irritation among the most senior Generals had reached such an intensity that it required all Moltke's grandeur of character, all his strength as a great General, all his calmness, all his presence of mind in this turmoil, to rescue his great idea, namely, to maintain the separation, which events had brought about, between the two hostile armies, and then, by passing south of Metz, obtain the advantage of the interior lines against Bazaine, from the dangers which threatened it.

All Moltke's tact, confidence in his own powers, patriotism, and wonderful energy had to come into play to prevent his being ground between two powerful millstones (the King and the Commanders of the 1st and IInd Armies), for this would have led to the destruction of his plan.

During these momentous hours, not only was a heaven-born General striving with men who could not grasp his ideas, but a hero in strength of character, courage, power of action, patience, and humility was striving against vanity, historical fame, popularity, and years of devoted service; and one may safely affirm that in this struggle anyone else would have been wrecked. If we consider the above conditions, and remember that, in addition to the military considerations, the social position and authority of certain personages had their influence, we must arrive at the conclusion that at no period of his life did Moltke shine more, both as a General and as an individual, than at this time, when he was not understood as he had expected he would be.

Captain Hoenig lays stress on the fact that, on the 18th August, two distinct battles were fought: one at Gravelotte, the other at St. Privat, and that, whereas at the former place the influence of the Royal Headquarters was felt, in the case of the IInd Army all influence over Prince Frederick Charles ceased shortly after 5 P.M. We certainly find no reference made to any reports received after 5 P.M. in the official account. On p. 169, vol. ii,¹ of the same we are informed that it was only during the night of the 18th and 19th August that the Royal Headquarters were informed of Prince Frederick Charles' victory at St. Privat. The battles of the 18th illustrate the fact that if the headquarters of a large force remain in rear of one flank, a general direction by the same over a fight, fought under the conditions that existed on that date, can only be maintained by means of a large amount of wear and tear on the part of the different Staffs, and, at the best, this influence must be an insufficient one.

The battle of Gravelotte was fought by the VIIth, VIIIth, and IInd Army Corps, supported on the right by the Ist Army Corps and on the left by the IXth. Here it was that the King commanded in person. St. Privat was fought by the Guard, XIIth and Xth Corps, supported on the right by the IXth Corps, which formed a weak connecting link between the two wings, and which, as a matter of fact, fought a third battle on its own account.

To understand the strategical situation with which Von Moltke had to deal on the 17th and 18th August, it would appear best to state the exact positions of the contending forces at about 2 P.M. on the former date.

Beginning with the French, the 2nd Corps, with Lapasset's Brigade of the 5th Corps, extended from St. Ruffine to about half-way between Point-du-Jour and Moscow; the 3rd Corps prolonged to the right as far as Montigny-la-Grange; the 4th ran from thence to north of Amanvilliers; the 6th was on the right flank, on both sides of St. Privat. Du Barnil's Cavalry Division was in rear of the 6th Corps, and the Guard Corps, Forton's Cavalry Division, and the main artillery reserve were in rear of the 2nd Corps. With the exception of some weak advanced posts, the main road from Ars by Gravelotte, Malmaison, Verneville, Halonville was free of troops. It was only at Ste. Marie-aux-Chênes that stronger bodies of French troops could be encountered.

The Germans were as follows:—Ist Corps at Courcelles-sur-Nied, 3rd Cavalry Division at Coin-les-Cuvry, 1st Cavalry Division at Corny, VIIth Corps in and near Ars, VIIIth Corps at Gorze, with one brigade in rear at Arry, IXth Corps south of Flavigny, 6th Cavalry Division west of the same, IIIrd Corps at Flavigny and Buxières, Xth Corps at Tronville, 3rd Cavalry Division and 3rd Guard Cavalry Brigade westward of Tronville, XIIth Corps at Mars-la-Tour and Puxieux, Guard at Suzemont, 1st Guard Cavalry Brigade at Sponville, 12th Cavalry Division at Parfondrupt, IInd Corps at Pont-à-Mousson, IVth Corps at Menil-la-Tour.

¹ The references are to the official translation, by Capt. (now Col.) Clarke, R.A., ret.

The opposing armies were consequently massed; the French extended over a front of 8 to 9 miles, the Germans, excluding the Ist, IInd, and IVth Corps, and the 12th Cavalry Division, over a front of between 12 and 13 miles.

For the 18th, the co-operation of the Ist and IInd Corps might be reckoned on, if they were required.

It is apparent that Marshal Bazaine had relinquished all the roads running west and north-west; the only one that he could safely use was the Thionville road.

We further see that the opposing forces were at right angles to each other, the connecting point being at the Bois de Vaux. The outer flanks were about 10 miles apart.

There might have been some excuse for the positions of the French cavalry. The inactivity of the German cavalry and their backward position was strategically indefensible. Captain Hoenig suggests the reason for this want of activity on the part of the cavalry in the first pamphlet under review. At the foot of page 32 he informs us "that undoubtedly the French had suffered no tactical defeat on the 16th; the excessive caution displayed by the Germans throughout the whole of the 17th is a pretty clear indication of their lack of confidence in themselves." Be this as it may, the only General who acted properly was the Crown Prince of Saxony, who sent his cavalry well to the front (to Parfondrupt). A similar proceeding on the part of the remainder of the cavalry would have led to reconnaissances being made towards Aboué and Conflans by the evening of the 17th. Had such been the case, the cavalry must have struck the enemy at Ste. Marie-aux-Chênes; they might, therefore, have fully cleared up the situation on the evening of the 17th, and rendered their reports in ample time for the Chief of the Staff to frame his directions accordingly. Both the French and the Germans were anxious to avoid fighting under any circumstances on the 17th. Both had the same object in view, though for different reasons. This fact gives us an opportunity of showing how Generals differ. A real cavalry leader would, by the manner in which he handled his men, have found out all he wanted to know about the enemy, and probably without the loss of a single man or horse. The Generals on both sides knew but little of what they should have known before they issued definite orders, for the simple reason that the skilled leaders were wanting, who would have understood to keep the cavalry in the palm of their hands, so as to avoid a battle, and at the same time thoroughly reconnoitre the enemy.

A great deal of space has been devoted in discussing the proper position for a Headquarter Staff both before and during a great battle. There has been such a tendency throughout Europe to fall down and worship everything the German Headquarter Staff did, simply because it was successful, that Captain Hoenig has done a universal service in questioning its infallibility. He compares the action of the German Headquarter Staff with that of Napoleon under similar conditions.

The nearer Napoleon was to his enemy, the further forward were

his Headquarters. On the night of the 13th October, 1866, they were in immediate proximity to the enemy. It is, of course, impossible to lay down any precise rules as to where the Headquarter Staff should be, but the following guiding principle should be remembered. The actual position of the Headquarters must always be dependent on the probable intentions of the enemy.

Napoleon's principle of being as close to the front as possible before an impending battle is as sound now as it was then; for, though the field telegraph can convey information practically instantaneously, the road to the battle-field must be travelled over by a horse, whose powers of endurance and speed are, after all, limited. Even if the Chief himself is both excellently mounted and also a first-class rider, the argument still holds good, for the horses conveying the subordinate Staff Officers have to be considered, to say nothing of the staying powers of the Staff themselves. Should the Headquarter Staff be many miles in rear of the troops, it may often be necessary for the Staff to ride forward at a rapid rate, and this must tell on the physical powers of the several members composing it. In action, the strain on the minds of Staff Officers is so great that every endeavour should be made to lessen any unnecessary physical exertion.

Such a course of action assumes that considerations for the sheltering of the Staff are relegated to the background. Should, however, the Commander-in-Chief be a man greatly advanced in years, the question of shelter must be considered, if he is to appear comparatively fresh on the battle-field. A General whose age is between thirty-five and forty-five will think nothing of spending the night in a tent in the midst of his troops, or even, if necessary, of dispensing with rest altogether; but it would be unreasonable to expect this from a General of seventy years and upwards. This shows us how desirable it is for a General to be vigorous and capable of standing hardships, to enable him to face extraordinary discomforts should special circumstances render it necessary for him to do so. Let us contemplate the Napoleon of Jena, Borodino, and Dresden in the position of the German Commander-in-Chief on the 17th August. We should have seen that the former would have undoubtedly stated precisely where he was to be found at certain fixed times, but that during these intervals he would have been here, there, and everywhere; he would have left no means unturned to obtain precise information as to the enemy's position.

On the 13th October, 1806, on his arrival at the front at 4 P.M., Napoleon personally reconnoitred the ground near Jena, although he had previously ridden many miles. (Such reconnaissances, of course, do not preclude the use of cavalry, which, after all, is the best way of obtaining information.)

We may be certain that the news of the battle of the 16th would have caused his early arrival, say at Rézonville, on the 17th, where he would have seen for himself how matters stood; he would have summoned the Commanders of both armies to his side, and, after obtaining the fullest information possible, he would have dictated the orders for the battle. As the right German flank would be exposed

to the greatest amount of danger while the forces were forming up, Napoleon would not have left the neighbourhood while this was occurring, reports would have easily reached him, and instructions be sent with equal facility. He would have spent the night of the 17th somewhere near the right flank, and at about 5 A.M. on the following morning he would have been in the saddle, first to observe how matters stood on the right flank, then, pursuing a northerly direction, he would have attempted to increase his knowledge of the state of affairs in that portion of the arena.

Napoleon, in his earlier days, would, without employing a single squadron of cavalry, have known by 7 A.M. on the 18th August whether any changes had occurred since the previous midnight, and if so, what changes. From that moment he would have remained with his Staff at the proper place for him to be—somewhere near Verneville—and never moved from the place until, possibly, matters were being decided at St. Privat. Napoleon would have considered it his business to be near his left flank, once matters had been put on the right track at the pivot (the right flank).

During the action, the German Headquarters were between Gravelotte and Malmaison; the choice of this spot was strategically wrong, and tactically unfavourable.

The correct position for the Headquarter Staff during a battle, for which preparations have been made, should be either somewhere near the centre, where they are more easily reached, or, should that be impracticable, they should be in rear of the strategic flank. By their position the Headquarter Staff should be able to deal, in all directions, with the most important features of the action, such as the time for commencing the fight, for bringing up the reserves, nature of flanking movements, &c. They should, however, be sufficiently in rear to remove them from the temptation of interfering with minor matters, for then, while attending to details, which it is the business of others to see to, the main threads may be lost, and there is the risk of their committing the greatest fault of all—commanding instead of directing.

A great difficulty the Headquarter Staff had to contend with was the excessive number of individuals who were attached to it.

Political reasons led to the Headquarter and Army Staffs having a large number of princely personages attached to them.

At the Royal Headquarters the age of the King was a constant factor that had to be considered, and at the Headquarters of the different armies other considerations seemed to have had their influence.

On the 16th August, while the battle was being fought, Prince Frederick Charles was at Pont-à-Mousson; he, consequently, reached the battle-field at a late hour. He spent the night of the 16th at Gorze; Steinmetz was at Coin-sur-Seille. The Royal Headquarters reached the heights near Flavigny from Pont-à-Mousson at 6 A.M. on the 19th; Moltke's orders for the following day were issued at 2 P.M. At that hour nothing was known as to the position and intentions of the enemy. Why were these orders issued at such an early period of

the day? The reasons given by Captain Hoenig are as follows:—As the crow flies, the distance from Pont-à-Mousson to Flavigny is 14 miles. Considering the King's advanced years, the exertions to which His Majesty had already been put were considerable, and one can fully understand the anxiety on the part of his Staff to spare him. The events of the following day were hidden in the future; the Germans, however, wished to fight the French. This meant fresh exertions for the Royal leader, and exertions which might well be considered beyond the powers of a man of his age. Consequently, there was a great anxiety to ensure, not only an early rest for the King, but a complete one. It was impossible to obtain this near Flavigny; the smaller farms and hamlets could not contain the numerous Staff, the larger ones were occupied by wounded men. It might have been possible to find suitable accommodation at Novéant; since, however, they could not remain on the field of action, it was considered preferable to return to Pont-à-Mousson. An early start back was therefore necessary. The Royal Headquarters came from Pont-à-Mousson and returned there on the 17th, and on the following morning rode forward again to Flavigny. In four-and-twenty hours they rode 42 miles.

A General who, like Napoleon, was in the habit of reconnoitring himself would, instead, have ridden as far as Auboué and back, a matter of 17 miles, and would, by this means, have known pretty well as much as he wanted to know.

Further, a young Commander would have remained on the spot till the receipt of the reports sent in at the end of the day, and would, in all probability, have spent the night among his troops.

The reports that are received can only be properly fitted together when the events of the day are before one. This is impossible until dusk. The orders issued at 2 P.M. were issued before the French evacuated Gravelotte, for this did not occur till 3 P.M. They were consequently issued while the enemy was known to be making changes in his dispositions. It must, however, always be remembered that Moltke was fully aware of this fact.

Captain Hoenig's critics have taken him severely to task for presuming to suggest that the King's age had anything to do with his return to Pont-à-Mousson, and he is accused, if not of committing an act of treason in suggesting it, of at least offending against the canons of respect and good taste. We propose giving the reasons urged by the "Militär Wochenblatt" for the return to Pont-à-Mousson, together with Hoenig's reply to the same. The "Militär Wochenblatt" states that the Royal Headquarters were not only the central point for the Ist and IIInd Armies, but also for those portions of the German forces which were still to come up to the front, as well as for the IIIrd Army. Which was the right course to pursue? Was it right to ignore these latter troops owing to the impending general action by the Ist and IIInd Armies, or were not the Headquarter Staff compelled to return to the spot whence they could pick up all the threads of the German movements? Telegraphic communications had been established between Pont-à-Mousson and Gorze by midday

on the 17th. The Headquarter Staff were consequently justified in assuming that important reports concerning the enemy near Metz would reach them without delay. Did not General Von Moltke form the opinion that the situation at 2 P.M. on the 17th August was sufficiently cleared, as to prevent the probability of any serious dislocation of the troops on either one side or the other occurring during the course of the day?

Hoenig should at least have discussed these points. He would eventually have arrived at the conclusion that the return to Pont-à-Mousson was undesirable; but he would have been forced to recognize that it is not so easy to act in war as it appears after the event, when additional knowledge clears up everything. He would, above all, have avoided making a serious and unfounded charge against the King, which both duty and proper respect should have rendered impossible; he would equally have avoided making an accusation against Von Moltke, who habitually carefully balanced and weighed any possibly conflicting duties.

It is possible that as outsiders we are less sensitive to criticism about the late German Emperor and Von Moltke than the Germans, for we fail to see where Hoenig has overstepped the bounds of duty or of good taste.

In the pamphlet under review, Hoenig deals largely with the case as it affects him personally. To us that is a matter of secondary importance. The strategical aspect, however, might be further considered with interest.

There was, he says, no reason for considering the position of the IIIrd Army. Even if the general action was delayed till the 19th or 20th August, though the IVth Corps, which formed a portion of the IInd Army, might have been brought into the sphere of action, no direct assistance could be expected from the IIIrd Army.

The reason armies receive directions is to obviate a series of special orders on the part of the Headquarter Staff. Directions consequently are intended to cover general objects, and longer periods of time.

Orders are intended to meet certain conditions at fixed periods of time. In this manner both the Headquarter and the Army Staffs maintain the freedom of action which is so desirable, and labour is diminished. The Headquarter Staff can further concentrate all its attention on the matter which at the moment appears most important, with the calm conviction that the armies which are not within tactical reach will act according to the general conditions of the campaign. According to the general conditions as known at the Royal Headquarters, the IIIrd Army was pursuing a certain object, which did not appear to call for any interference on the part of the Headquarter Staff. Even supposing any interference to have been necessary, the return to Pont-à-Mousson, where all the means for communicating orders were located, was unnecessary. The lesson to be learnt is that a Staff may be too unwieldy, but the argument that it was necessary to return to Pont-à-Mousson to issue orders is as unsound as the argument that a gunner, in order to make proper use of

his gun, should leave it to get ammunition from the ammunition column.

The Headquarter Staff had not yet rid itself of some of the bad habits which the war of 1866 had proved awkward and inconvenient.

Here are Von Moltke's own views on a certain situation, and related in the third volume of his "*Gesammelten Schriften*," p. 425 : "The King spent the night in a hamlet on the battle-field, both my Staff Officers and I had, however, to drive back 22 miles to Gitschen, where the offices were. It was midnight before we arrived. We could get nothing to eat at that hour, and I was so exhausted that I lay down on my cot without removing my sash or great-coat, and fell asleep at once. In the meanwhile fresh orders had to be prepared and laid before His Majesty at Horitz the following morning." We now learn that the evil consequences of having all the means of issuing orders so far in rear had already made themselves felt in 1866. To return to Von Moltke as he was in 1870. Moltke represented a certain school of thought, and he considered everything that his opponent could do and should do from the point of view of this school. Moltke's school, in contemplating the possible action of an opponent, always presupposed that the latter would take the steps from which he would derive most advantage. This must be borne in mind in considering the orders of 2 P.M. on the 17th August, which were as follows :—

"The IInd Army will be formed up at 5 o'clock to-morrow morning, the 18th, and advance in *échelon* from the left between the Yron and the Gorze brooks (generally between Ville-sur-Yron and Rézonville). The VIIIth Army Corps will accompany this movement on the right flank of the IInd Army. Upon the VIIth Army Corps will devolve, in the first instance, the duty of protecting the movements of the IInd Army against any hostile enterprises from the side of Metz. His Majesty's further arrangements will be dependent upon the measures of the enemy. Reports will, for the present, be sent to His Majesty on the heights south of Flavigny.

(Signed) "V. MOLTKE."

Moltke at that time had no reason for supposing that Bazaine was actuated by political motives. The strategical disadvantages to the French of a decisive action backed on Metz were obvious. To the great strategist the improbability of Bazaine's actual action appeared as great as the conduct of the Prussians during the Jena campaign, when they remained in rear of the Saal, appeared to Napoleon. On the 18th August the French committed an act which exposed them to the greatest strategical dangers. Neither a Napoleon nor a Moltke can believe in such errors without ample proof. If he is not to go wrong, a strategist must always keep in his mind's eye what the enemy's correct move, under certain conditions, would be. Moltke's orders at 2 P.M. on the 17th presupposed that the French would act strategically correctly, but it was so framed that the German march towards the north would have led them past the French on the 18th.

Napoleon's action in 1806, when he expected to find the Prussians at Gera, was very similar. Napoleon, however, when he discovered his error did not rest till he had rectified it, before the battle. Moltke did not succeed in doing so before he fought his action. Had Moltke and his Royal Chief been thirty years younger, they too would have acted as Napoleon did; their erroneous assumption could have been rectified more quickly and with greater ease than Napoleon was able to rectify his, as the distances with which they had to deal were much less than the distance from Gera to Jena; it was also easier to observe what had occurred, the days were longer, and the means at hand for conveying orders were more numerous and were better schooled. Though no blame can be attached to Moltke, because he only believed in the improbable, when he was thoroughly convinced that it had taken place; blame must rest on him for being unaware till such a late hour of what had occurred. The reason for this ignorance was that both cavalry and Staff Officers had neglected to reconnoitre. The most incredible things occur in war. A methodical mind, and still more a conscientious mind, finds them more difficult to deal with than a bold and roving conqueror would find it. Once again during the campaign Moltke had to deal with the improbable and unforeseen, mainly before the decision to march towards Sedan. There also we find Moltke credited his enemy with doing the right thing, till all doubt was absolutely solved. At Gravelotte Moltke nearly missed the French, although the German right flank had been continuously engaged with the enemy since the 16th. Before the operations leading to Sedan both opponents nearly marched by each other.

It will have struck our readers that Hoenig constantly asserts that had Moltke or some members of his Staff personally undertaken reconnaissances, some, if not many, of the errors of the 18th August would have been obviated. As Napoleon constantly undertook reconnaissances himself; it would be well to consider whether in the future Chiefs of the Staff should take Napoleon or Moltke as their models in this respect.

The successes of the Prussians in 1866 and 1870 were so vast and so tremendous in their political consequences that for years critics were afraid even to suggest that the Prussians could have committed any great mistakes, and a school arose both in Germany and abroad which preached that every action of the Headquarter Staff in the War of 1870-71 must be considered as a model for the future. This school taught that it could not be the business of the Commander-in-Chief personally to make reconnaissances; that he had other instruments for that work. His business was to sift the wheat from the chaff when the reconnaissance reports reached him.

This school is a fit representative of one of the crazes of the spirit of the times, which has already wrought havoc enough. The craze we refer to is the desire to formulate a rule to meet all emergencies, which thinks more of creating an impression on the reader by stating things crisply and concisely than in stating them in a manner which may prove instructive. A matter of such importance as the personal

conduct of a Commander cannot be settled by a simple yes or no. If a Chief receives information bearing on the strategy of the campaign, he would undoubtedly not make a personal reconnaissance. In the case which we are specially considering, on the 17th August, 1870, touch had been established with the enemy by the battles of the 14th and 16th August. It was possible to observe the greater part of the enemy's movements for hours with the naked eye, and follow them to their completion. Uncertainty still prevailed as to whether the full forces of the enemy purposed remaining near Metz, or only a portion of the same. Under the above conditions it certainly does appear that the Commander-in-Chief or his Chief Staff Officer should personally reconnoitre.

The Germans might have ascertained without any difficulty by 6 P.M. that their opponents had no intention of running away from them. The reports that would have come in would have led to the conclusion that the French were awaiting their opponents' attack in a prepared position. The days in August being longer than they are in October, the Germans had better means of finding out what the enemy was doing than Napoleon had at Jena. Their facilities for making all the necessary arrangements were also greater. Gravelotte—St. Privat was a prepared position. Under these circumstances the Commander-in-Chief or his representative should personally conduct a reconnaissance, no matter how good the information he receives may be. The subject must be considered without reference to the age of any individual. In dealing with military science neither the age of a Radetzky, Alexander, Cæsar, nor Napoleon can be considered. Unless a General intends resigning all direction of a battle, he must personally reconnoitre the enemy, as Napoleon did before Jena. The wonderful magicians of the present day think they have solved the matter by stating that now-a-days a leader of armies should only be a strategist even in action. A leader always was a strategist, even during an action, otherwise he would be no leader. If, however, he does not intend the results of his strategical work slipping through his fingers, he will prefer conducting the battle as well. The leadership during the battles of Gravelotte and St. Privat would have been better had the reconnaissances been properly made. Until the 18th August all the previous actions had been improvised; on the above date the Germans were at last in a position to fight a prepared battle, and had more time to make all their arrangements than is usually the case. Yet fate willed it that under Moltke's very eyes the "curse" of improvised fights and the very thing that Moltke hated, namely, difficulty of leadership or absolute want of leadership, should occur. We must, however, bear this great fact in mind: Moltke succeeded in massing nine army corps and six cavalry divisions at the right time, so that, if necessary, they might all have been brought into the fighting line, and in the strategically decisive direction. That is the greatest material and strategical feat that has ever been performed, and had Moltke been Commander-in-Chief instead of being Chief of the Staff he would have conducted the second portion of the task, the direction of the battle, with equal skill.

We should now have had a model of how to form troops up for attack with an inverted front, and from this formation we should have seen a prepared attack made not only against a prepared position, but also against a naturally exceptionally strong one.

It will be noticed that in the Orders of the 17th the 1st Army as such is not mentioned. This annoyed General von Steinmetz, more particularly as the VIIth and VIIIth Corps received distinct instructions, while no reasons for such conduct was given in the order. Hoenig states that on receiving this order Steinmetz was furious. He considered the treatment that he, as Commander of an Army, had received was most inconsiderate. If the Commanders of an army were going to be ignored they were unnecessary. Out of his army only one corps remained at his disposal; the 1st was removed from his direct influence, the VIIIth entirely so. Two Commanding General Officers were not required for the VIIth Corps; he no longer commanded an army, he was a useless cipher!

General von Steinmetz was one of those Generals who when they receive a certain command assume the rights of proprietorship over it. But should any portion of the same be taken away from them for however short a time, they feel offended.

General von Steinmetz would appear to have been an awkward man to deal with. In the "Twenty-four Hours," Hoenig does not enlarge any further on Steinmetz's personal characteristics, but in the pamphlet of "The Royal Headquarters and Army Headquarters" he has, owing to the action of his critics, drawn the veil further apart. We are informed that the relations between General von Steinmetz and Prince Frederick Charles were so strained that it was considered better that they should not meet each other. The relations between Moltke and Steinmetz on the one hand, and between Moltke and Prince Frederick Charles on the other, were also very little better. It was probably on that account that the three Generals mentioned did not meet each other on the 17th. Had they met, many mistakes, mainly of omission, might have been rectified. The relations between General von Steinmetz and General von Goeben would not appear to be of the best, if the following anecdote, related in the pamphlet, be correct. During the battle of Gravelotte, Steinmetz sent Goeben an order to send the 32nd Brigade into action. Perceiving the order was not executed at once, Steinmetz rode up to Goeben, who had dismounted, and said, "Did your Excellency not receive my order?" Goeben replied, "Yes, I received it." Whereupon Steinmetz said, "Does your Excellency intend to carry it out or not?" Goeben answered, "I was considering, your Excellency, whether it was advisable at this period to let my last available troops out of my hand, more especially in the direction named." Steinmetz said, "Your Excellency, I order you to do so." This closed the conversation. Considering that both Officers were of equal rank, and that it was at least very doubtful whether Von Goeben was under Von Steinmetz's orders at that period, the stiffness with which these two Officers addressed each other is peculiar.

The ostensible reason given for Steinmetz's anger is that he was

indignant at any of his subordinates receiving orders direct from the Chief of the Staff, and Hoenig, in discussing the particular order in question, raises a curious point. The VIIth Corps was known to be scattered; the greater part of the corps was pent up in two valleys, separated from each other by large woods difficult to traverse. The VIIIth Corps was near Gorze, $4\frac{1}{2}$ miles west of the 14th Division, separated from it by a difficult woodland country, and withdrawn from the command of Von Steinmetz. A disaster might easily have happened to the VIIth Corps before it received support from that quarter, neither could Von Steinmetz claim that support.

In tactics, as well as in strategy, situations must arise which cannot be dealt with according to book, situations in which certain risks must be run, and which one must pull through somehow. In fact, one must trust to luck. The position in which the VIIth Corps found itself was one of these. It was bad enough that one corps should be thus unfavourably situated, but the greater the number of troops that were brought into this position the worse the situation became. Doubtless a man of Moltke's genius felt this, and that was probably the reason why the VIIIth Corps was removed from Steinmetz's command at this critical period, and Steinmetz probably knew it. One can well understand that his feeling of irritation towards Moltke reached its culminating point at about 4 P.M. on the afternoon of the 17th.

Steinmetz, feeling that the VIIth Corps was in a critical position, and that he had no troops to support it, sent a report to Pont-à-Mousson to that effect. This report reached the Royal Headquarters during the night, after Moltke had retired to rest. Here is another proof of the great delays which may arise when Headquarters are at a distance. Moltke's reply was sent from Pont-à-Mousson at 4 A.M. on the 17th, and was: "The VIIth Army Corps has at first to observe a defensive attitude. The connection with the VIIIth Army Corps can only be sought to the front. *Should it happen that the hostile army throws itself into Metz, a wheel to the right will take place on our side.* The Ist Army, if necessary, will be supported from the second line of the IInd Army."

This answer of Moltke's is of some historical importance, as it is the first intimation of Moltke's plan, namely, to bring about the surrender of the Army and of the fortress. It is true the enemy had not thrown himself into Metz—that occurred after the battle—but he was found in a position which rendered the wheel to the right necessary. It is further worthy of note, that the instructions in no way bound the VIIth Corps to the defensive, but only to a defensive attitude, and that only at first. The mention of a possible necessary support also implies that Moltke did not consider that the further action of the VIIth Corps was to be defensive. The defensive attitude in fact applies to duties of the VIIth Corps while it was forming the pivot during the wheel, and was not intended to apply to the battle itself.

General von Steinmetz appeared to fear an attack by the French, either from the valley of the Moselle, or from Gravelotte; in the first

case the German communications would be cut, but the armies themselves would not be encountered; in the second case they would have been struck straight in the right flank. However, the first was improbable, and the second equally so, otherwise the French would not voluntarily have evacuated Gravelotte. General von Steinmetz was aware of this fact, and it was as easy then to conclude that no attack would be made against the German right as it is now.

At 8 A.M. on the 18th August, the impression at the Royal Headquarters was that the main forces of the enemy had retired on Metz, and that they reached as far north as Amanvillers. The IInd Army was consequently directed not to extend so far to the left. At that hour the Royal Headquarters were at Flavigny, the headquarters of the IInd Army at Vionville, those of the Ist on the way to Gravelotte. None of the three were where they should have been. The Royal Headquarters should have been on their way to the high ground near Verneville; those of the IInd Army at Caulre Farm; and those of the Ist at Gravelotte.

At 9.30 A.M. they were still in ignorance at Flavigny of the enemy's movements; the impression then prevailing was that the enemy was moving on Briey. It would appear that it was considered impossible to get positive information on that point, although the right wing of the French had for the last twenty-four hours been within 5 miles of Caulre Farm, and there were four German cavalry divisions available.

At about 10 A.M. the Headquarter Staff had a third opinion as to the enemy's intentions, and though nothing new had apparently been discovered, but only a fresh report about the enemy's positions near the Bois de Vaux, which conveyed no fresh intelligence, the orders for the battle were issued at 10.30 A.M. Their influence on the fight in the Mance ravine is so considerable that they are reproduced:—

“From reports received it may be assumed that the enemy intends to maintain his position between Point-du-Jour and Montigny-la-Grange. Four French battalions have moved into the Bois des Genivaux.

“His Majesty is of opinion that it will be desirable to move off the XIIth and the Guard Corps in the direction of Batilly, so as in the event of the enemy retreating on Briey, to meet him at Ste. Marie-aux-Chênes, or, in the event of his remaining on the height, to attack him from Amanvillers. The attack should take place simultaneously, by the Ist Army from the Bois de Vaux and Gravelotte; by the IXth Corps against the Bois des Genivaux and Verneville; by the left wing of the IInd Army from the north.

(Signed) “VON MOLTKE.”

One will notice in these orders that the Headquarters were, even then, in a state of uncertainty as to whether the enemy was on the march or not. This is one of the extraordinary incidents that will happen in war.

Before the orders of 10.30 A.M. reached the IInd Army, Prince

Frederick Charles had, at 10 A.M., directed the IXth Corps to march on Verneville and La Folie, and, "in the event of the enemy's right wing being in position there, to open the attack in the first place with the deployment of a large force of artillery" (p. 17, vol. ii).

These instructions were unfortunate, for they exposed the IXth Corps to the risk of making an isolated attack, and, as matters actually occurred, nullified Moltke's intention of making a combined one.

Prince Frederick Charles recognized his error, and at 11.30 A.M. he sent fresh instructions to the IXth Corps to delay the attack. It was, however, too late. A point that will strike one in connection with these instructions issued by Prince Frederick Charles is that, although both the Ist and IInd Armies had not discovered the French right flank in twenty-four hours, it seems to have been considered quite as a matter of course that the IXth Corps should come upon it. Why it should do so is not so obvious.

How was it that, even as late as 9.30 A.M., both the Royal Headquarter Staff and Army Headquarter Staffs believed that the French were on the march? What object would the French have had in so doing? Their object would have been to get away from the Germans *as quickly as possible*. Since the morning of the 17th, the Germans knew that their opponents were on the move. The distance from Gravelotte to Auboué is $7\frac{1}{2}$ miles, to Conflans $9\frac{1}{2}$ miles. Had the enemy been marching since the morning of the 17th, with even only moderate marching capacity, the whole army would have crossed the Orne by 9.30 A.M. on the 18th. How was it, then, that, at that hour, the Germans thought the French were moving away from their position at Point-du-Jour and Leipsic, since, at 9 A.M., Colonel von Loë had reported that there were $1\frac{1}{2}$ to 2 Army Corps in that position (p. 13, vol. ii)?

If, on the 17th, the Germans believed the French were marching away from them, their error in not watching their enemy was increased. It was most improbable that, on the morning of the 18th, the French should be moving away to the Orne. By that time they must either have accomplished the march, or be close at hand. The former was uncertain; but the French position at Leipsic and Point-du-Jour was an obvious indication that they had adopted the latter alternative.

If, however, the Royal Headquarters were in any state of uncertainty on the matter up to 9.30 A.M., why did they not, on their arrival at Flavigny at 6 A.M., cause the necessary reconnaissances to be made? This flank march of the IInd Army, with the Guard and XIIth Corps crossing each other, and the Cavalry Divisions in rear, within 5 miles of the enemy, is one of the most extraordinary incidents in military history. What would have been the consequences had a hostile General struck this mass, say at 8 A.M., while the manœuvres of the Guard and XIIth Corps were in full swing?

Undoubtedly the attention of the IInd Army was concentrated rather towards the north than towards the east; but, considering the assumption under which the march was made, a reconnaissance in an

easterly direction was as necessary as one in a northerly, and the first Officer (Lieutenant Scholl, p. 18, vol. ii) who rode a little distance away from the troops towards the north-east, discovered at once, without the least difficulty, the French position at St. Privat.

How does the official account describe these events?

Ground which is easily observable is described as the reverse; the crossing of the Guard with the XIIth Corps which delayed the former three hours, is justified and explained as being intentional.

The backward position of the 5th and 6th Cavalry Divisions is attributed to the difficulties of water supply. Not a word about the omissions in respect of reconnaissances or leadership on the part of the Commander of the army. Everything would appear to have fitted in nicely and smoothly, and the greatest skill seems to have been employed in painting white black and black white. This has been done so well that many a reader is successfully deceived.

It will be noticed that, though the orders of 10.30 A.M. still display some uncertainty concerning the position and intention of the enemy, they differ materially in one respect from the orders of the previous day issued at 2 P.M. In the latter, the main direction is a northerly one, with a possible move eastwards; in the former, the direction of the march is reversed. The extraordinary thing about the matter is that, although such a radical change was made in the last issued orders, no additional information had come to hand to cause it.

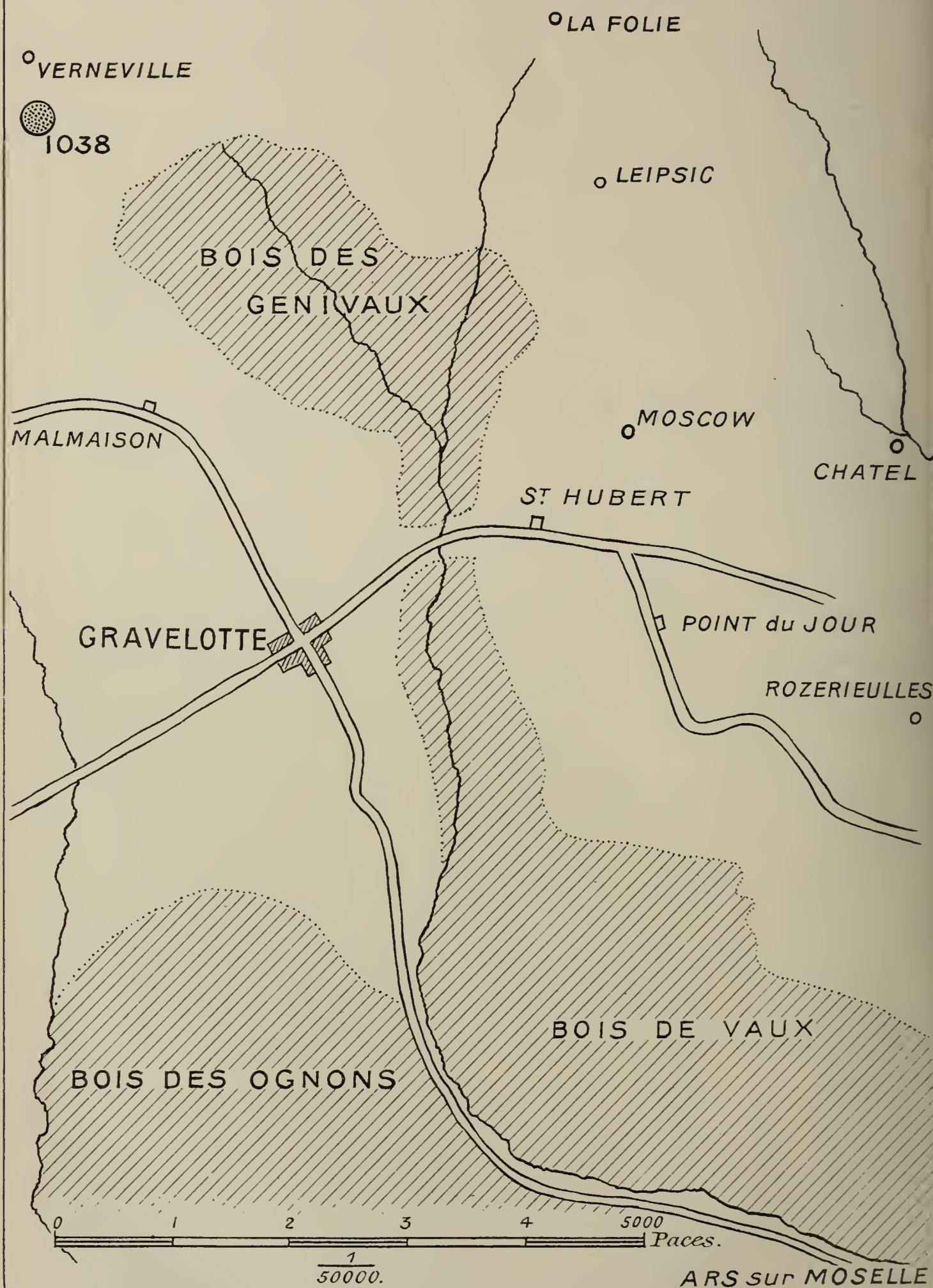
When we examine the contents of these orders and consider that the reasons for their issue were based on scanty and contradictory reports, without any verbal interchange of impressions on the part of the Commanders of the Ist and IIInd Armies, who were close on the spot, we must come to the conclusion that they might equally well have been issued from Pont-à-Mousson, or any other place, instead of from Flavigny. The Headquarter Staff was put to great physical exertions to reach Flavigny on the 17th. Their reasons for so doing were that they expected the fight to be renewed under favourable conditions on that date. This was, however, delayed for twenty-four hours, and in the meantime the ground should have been cleared up to ensure the conditions being favourable when the fight was renewed. This did not occur; the three Staffs, the Headquarter and both Army Staffs, quitted their forward positions at the very period when they should have remained there; and, after a lapse of close upon twenty-four hours, the orders for battle were issued, with but slightly increased knowledge from that which was at hand on the 17th.

We notice both an extraordinary waste of physical power and at the same time an absolute omission to make proper use of the means that were at hand. The works were not working smoothly.

The Headquarter Staff left Pont-à-Mousson in order to be near the front, in a better position to know how matters stood; however, they found out nothing more than might have been heard at Pont-à-Mousson, and they made no particular attempt to do so.

As the three Staffs already mentioned were within a small area of ground, for a matter of eight hours, one might have thought that the

NEIGHBOURHOOD OF GRAVELOTTE.



Army Commanders and the King, or his Chief of the Staff, would naturally have had some verbal communications with each other. We know how, in other cases, notably the Waterloo campaign, the great exertions Commanders of armies have made to ensure having a personal interview. Here, though almost touching each other, all communications were sent by Orderly or Staff Officers.

The orders for the 17th had barely been issued from Flavigny, when further written communications were continued between Ars and Pont-à-Mousson, and *vice versâ*, simply because all personal interviews had been avoided. These written communications, instead of ensuring a mutual understanding, only increase the already existing frictions. A personal interview might have explained everything, to the mutual satisfaction of all concerned, and saved a vast amount of the trouble which occurred later.

More might be said, but the above appears sufficient to show that the works were not running as smoothly as is desirable in such a crisis as we have been discussing.

It will be noticed that the orders of the 18th speak of a simultaneous attack on the part of the Ist and IInd Armies.

To make a simultaneous attack against a position, two conditions are necessary: the extent of the position must be accurately known, and the attacker must, at all points of his attack, be equally distant from his objective. Should one or other of these conditions not be satisfied, a simultaneous attack is impossible. The Royal Headquarters were aware that the conditions were not so satisfied. They knew from the reports that reached them, about 10.30 A.M., that the IInd Army was somewhere on the line Caulre Farm—Jarny, that the Guard Corps was considerably in rear of this line, neither ready to, nor capable of, wheeling in any direction. But even if the necessary conditions had been satisfied, a simultaneous attack would have been impossible. When a position extends over a distance of 6 miles, a simultaneous attack against it cannot be made, except in theory. Napoleon's practice in such cases was to worry the enemy along the whole front with his light troops, and make the enemy show his dispositions. When this had occurred, the assaulting troops, who were ready formed up, made the real attack. In future we shall see that this will be the course of action against all prepared positions; and that is why Captain Hoenig lays so much stress upon this identical point.

The main points brought out by Captain Hoenig in the first part of his book, dealing with the strategy of the 17th and 18th August, have been placed before our readers. We will now discuss the second portion of his book, and the second pamphlet, which deal with the tactics on the German right during the battle of Gravelotte.

In the second part of his work Captain Hoenig gives a lengthy and detailed description of the French position. There is nothing in it calling for special notice, excepting that he reminds us that the majority of troops defending the position from Rozerieulles to Moscow, about 2 miles in extent, were troops who had fought at Spicheren and at Vionville, and that three German army corps tried

unsuccessfully to turn them out of it. The French had about 23,000 rifles and 90 guns on the front named. The Germans had 44,000 rifles and 190 guns available. He then discusses the causes for this failure.

He contradicts, on the authority of reliable eye-witnesses, whom, however, he does not mention, the statement in the official account, that the French had covered communications between the main and the advanced position, as well as the statement that Point-du-Jour and Moscow had been converted into small forts (p. 7, vol. ii). The French had contented themselves with loopholing the walls and with constructing shelter trenches on each side of the buildings in question. We are further informed that the undergrowth in the woodlands of the Mance ravine did not render it impossible to keep the infantry in hand; it would only have made it more difficult. Where a man can find standing room, infantry can march. Jackson and Lee might have taught the Germans that such was the case.

From the German point of view there was a great lack of communications from the rear to the front, in the Mance ravine. These are an absolute necessity, when a serious attack is intended; and we know from Moltke's orders, issued at 10.30 A.M., that the 1st Army was intended to attack from the Bois de Vaux and Gravelotte.

On the eve of the battle of Jena, Napoleon, finding there were not sufficient means to bring his artillery up to the front, had a road made for the purpose. The Germans had ample opportunity of cutting two openings in the wood, north and south of the main road, on the west side of the ravine. After St. Hubert had been captured, this work could have been continued up the eastern slope to the far edge of the wood. It might have been completed by 4.30 P.M. Only when that work was completed were the necessary conditions satisfied to enable the troops and their supports to be formed up and deployed for attack. Had the ravine been crossed by three different roads, the French would have been compelled to disseminate their fire, and we may well believe that the failure of the Germans on that part of the field was mainly due to the fact that their opponents were able to concentrate all their fire on the main road, and, thereby, shatter the heads of the German columns as they attempted to deploy after crossing the defile.

One of the theories of an attack in these days is, that the artillery of the offensive, after subduing the defender's artillery, should direct its fire on the defender's infantry, and only when the infantry are shaken, the attacker's infantry should proceed and complete the work.

Probably the reason that this theory has met with such general acceptance is that the majority of English military writers are gunners, or their brethren of the other scientific corps.

Infantry, combined with artillery, must, however, invariably prepare the attack. Undoubtedly artillery has made great advances within the last twenty-two years; but we must remember that in future campaigns no artillery is likely to be so hopelessly overpowered as the French artillery were at Gravelotte. Yet, on the 18th August,

1870, 132 German guns, concentrated on a front of 2,200 yards, were unable, after a fire that lasted seven hours, to shake the hostile infantry.

If it be urged that at St. Privat the German guns met with a success that they did not meet with on the right flank, we would reply that it was not the artillery that drove Marshal Canrobert out of St. Privat, but the empty pouches of his men. Good infantry can only be shaken by a combination of artillery and infantry fire. At Gravelotte the Germans did not take adequate steps to ensure this combined action between the two arms; had they done so, it is possible, nay, probable, that even their frontal attack against Point-du-Jour would have succeeded.

It may be contended that the inferiority of the German infantry weapon to that of the French rendered it impossible for the Germans to attempt to prepare the attack by infantry fire. If, as we will remind our readers, two batteries, exposed to a cross-fire of artillery and infantry, within a range of 800 yards, were able to remain in action for hours (we refer to the two German batteries near St. Hubert), if one cavalry regiment (4th Lancers) remained about half an hour exposed to the same fire, and the 9th Hussars for even a longer period of time, surely one was not asking too much of infantry in expecting them to throw up shelter trenches at about the same range. We would lay stress on that point, for in future campaigns circumstances will arise which will render such a course necessary, in order to ensure an effective position for the preparatory infantry fire. From this position the fire may possibly be maintained for the whole day, and on the following day only will the decisive attack be made. Had the Germans acted in this manner on the 18th August, 1870, it would have been possible for them to have got within 500 yards of the main position of the French, whence the needle gun would have met the Chassepôt on equal terms. There is nothing new in this. Lee's troops made entrenchments miles long under hostile fire. Both for offensive and defensive purposes, a strong infantry position east of the Mance ravine, from whence an effective fire could be poured in against the enemy, was necessary, if the Germans wished to ensure success in that quarter.

The French advanced post of St. Hubert was, it is true, captured with comparative ease. This is due to the fact that the superiority of the German artillery rendered any support to the French infantry in that farm impossible. This is no contradiction to what has been written above, for it is a different thing expecting infantry to advance over perfectly open ground, swept by artillery fire, to support advanced troops, and calling on them to hold the main defensive position, where they are sheltered either naturally or artificially. That the forty-three companies were able to hold on at St. Hubert for some hours is due to the fact that the French artillery were unable to come into action against the place. For when artillery has ranged itself, a farm building surrounded by stone walls is about the worst place troops can be in.

Having pointed out, generally, the points in the German tactics to

which Captain Hoenig takes exception, we will examine, somewhat in detail, the course of action pursued. Before proceeding we must again refer to the personal relations between General von Steinmetz and General von Goeben. It is instructive in this way: It is a notorious fact that, in the French Army, the personal jealousies between the different Generals led to their doing nothing to assist each other. In the German Army, though the relations between several of the Generals were greatly strained, the sense of duty was too strong to cause such a fact to prevent their doing what they knew to be right, though, as we have seen, indirectly, this want of harmony was not without its influence on the course of the campaign.

We know from the official account (p. 70, vol. ii) that before proceeding to attack St. Hubert the VIIIth Army Corps formed up under cover of a hollow north of the main road and west of Gravelotte. In Captain Hoenig's pamphlet on the fighting near the quarries we are informed that, while the troops were resting in this hollow, General von Goeben's Chief of the Staff informed the General Officers Commanding the two divisions of the corps that it was General Steinmetz's intention that the VIIIth Corps should capture the wood lying in its front, occupy it, and maintain itself on its eastern edge. The 29th Brigade would attack south of the main road, the 30th north of the same. After capturing these positions, both brigades were to secure the exit from the main road. The VIIth Army Corps would connect with the 29th Brigade, prolonging the line to the right. After this, General von Steinmetz purposed sending the combined artillery and cavalry of the Ist Army over the Mance ravine. The artillery would engage the enemy at close ranges, while the cavalry was to maintain a constant series of attacks on the shattered foe. The General Officers Commanding the VIIth and VIIIth Corps were to decide as to the actual moment the artillery should cross the ravine. That was the general outline of General von Steinmetz's plan. It could hardly fail if the German infantry held its ground on the eastern edge of the woodland and covered the artillery as it came into action as intended; this would naturally take place with as little delay as possible.

General von Steinmetz was of opinion that the enemy would be unable to resist this artillery fire, but would retire. This would give the cavalry their opportunity.

The Generals to whom this plan was communicated suggested that, in the event of St. Hubert being occupied, it would be necessary to capture it before the artillery advanced, and, even when the capture had been effected, the artillery, in column of route on one road, would be under hostile fire both while in the defile and afterwards while coming into action. General von Steinmetz hoped, however, that by rushing the artillery over he would be able to execute his plan.

We know from the official account that the Commander of the Ist Army held on to the above idea throughout the whole action, the orders given at about 3.15 p.m. for the cavalry and artillery to advance over the ravine were issued in accordance with the intentions mentioned above.

It would appear that this plan was not communicated to Officers

commanding regiments, for none of them knew exactly what was wanted of them.

The question naturally suggests itself, Why did General von Goeben, who habitually communicated personally to his subordinates the tasks they were intended to do, refrain on this occasion from acting as usual? It would appear to be due to the friction that is apt to occur between Generals in war. General von Goeben, not being at that period under General von Steinmetz's command, may have considered these special instructions in the light of an unauthorized interference with his own command. Knowing the man with whom he had to deal, Von Goeben did not choose to have a personal discussion with Steinmetz on the subject. He did not, however, oppose his Chief of the Staff repeating what had been communicated by the Chief of the Staff of the Ist Army. Though not directly under Steinmetz's command, Goeben did not care to oppose Steinmetz's plan, but, as he did not communicate them personally to his subordinates, Captain Hoenig infers that his reason for not doing so is because he considered his plan impracticable. Under the circumstances, General von Goeben should have seen the Commander of the Ist Army and have informed him both of his doubts as to the soundness of the proposed plan, and have reminded him that the VIIIth Corps was under the orders of the Commander of the IInd Army. General von Goeben probably thought that he would trust to luck, and if the worst came to the worst, and his artillery was ordered across the ravine, it would be time enough then to express his doubts regarding the practicability of the scheme.

In the meanwhile he would not oppose the infantry of the 15th Division being employed as Steinmetz wished.

Be that as it may, Goeben at no period of the battle made the least attempt to send any of his artillery over the Mance ravine, and it is very doubtful whether he ever received a direct order, as the Commanders of the VIIth Corps and 3rd Division did, to send their artillery across.

In the account given of the transaction in the Prussian official, we can only infer that General von Zastrow received orders to send his artillery across the ravine, for it is not stated in as many words that he received orders to do so (p. 93, vol. ii). Neither do we find any mention of General von Hartman receiving similar orders.

Captain Hoenig raises an interesting point about the Gravelotte—Point-du-Jour road.

The road in question formed such an important tactical feature in the fight that it was of the utmost importance to specify clearly before the action whether it fell solely to the VIIIth Corps, or whether General von Steinmetz proposed sending other large bodies of troops to the front along it. This circumstance alone should have led to General von Goeben seeking a personal interview with the Commander of the Ist Army. As matters actually stood, both Goeben and Steinmetz had a perfect right to use the road in question, Goeben owing to the position his corps occupied, and Steinmetz in consequence of Moltke's orders that morning.

Unless some agreement was arrived at on that point, misunderstandings and confusion must inevitably result. General von Goeben was a very "level-headed" man, and it throws a peculiar light on the relationships between the two Generals in question, when the junior declined taking any steps to make matters work somewhat smoothly.

The four batteries of the 14th Division came into action at about 12.30 P.M., on the high ground south of Gravelotte, and were reinforced by three of the 13th Division, at about 1.15 P.M. After a short period of time, the German guns established their superiority over their opponents; several limbers and wagons belong to the latter were seen to explode. On the 17th the Officer commanding the divisional artillery had reconnoitred and chosen the position his batteries occupied on the following day. He knew the distance to Point-du-Jour, and his guns were consequently able to range themselves very rapidly; it is mainly due to this fact that the Germans were able to establish their superiority in such a short space of time. As there was ample room for the three batteries of the 13th Division to come into action together, it must be considered that a tactical error was committed in permitting these latter to come into action on both flanks of the guns of the 14th. As this artillery line was being formed, *i.e.*, shortly after 1 P.M., Von Steinmetz received Moltke's instructions, which had been sent off from Flavigny at noon, directing that at first only the artillery should engage. The messenger had taken over an hour to do less than 4 miles.

The infantry of the VIIth Corps notoriously accomplished very little at the battle of Gravelotte. When we examine the aimless way in which brigades and even regiments were split up, it will assist us in understanding how it was that so little was done on the German right flank.

The 26th Brigade was complete and stood near Ars; the 27th Brigade was massed south-west of Gravelotte. The 25th Brigade consisted of the 13th and 73rd Regiments, the 28th of the 53rd and 77th.

The 1st and IIInd battalions 53rd were on the northern edge of the Bois de Vaux, fronting towards the quarries of Rozerieulles, the 7th Jaeger, the divisional battalion of the 13th Division were with them. The III/53rd were on the right of the artillery line. The II/77th were there as well, while the III/77th were with the corps artillery. The I/13th was north of the Mance mill, the IIInd and III/13th somewhere in the Bois de Vaux, supporting the two battalions of the 53rd. The 1st and III/73rd were with the III/53rd and II/77th, the II/73rd at the Mance mill. The front occupied by the VIIth Corps extended over 4 miles. The consequence was that there was no vigour in any of the attacks made by the several portions of that corps.

We find that at Gravelotte the French generally made use of advanced positions, and considering the nature of the ground on the French left and left centre, we are inclined to agree with Captain Hoenig, who defends the action of the French in this respect. The

French main position was a very strong one; both from it and from the advanced positions occupied they were able to conduct a simultaneous fight. Marshal Lebœuf was undoubtedly right in occupying the western edge of the Bois des Genivaux, disputing the occupation of the same with his opponent, and forcing him to an early deployment and expenditure of force and energy in overcoming the resistance offered. The French could retreat through the wood without difficulty, while they had every reason to hope that a German advance through the same would lead to a dissemination of various units.

The account of the advance, as given in the official account, p. 77, is not sufficiently detailed to bring out the points on which Captain Hoenig lays special stress. We purpose giving an account of this advance, as related in the pamphlet on the fighting near the quarries. The 33rd Regiment was in the first line, the 60th in the second. On advancing into the Mance ravine the whole regiment kept south of the main road and proceeded in échelon from the left; the 3rd battalion, whose left reached the main road, leading, followed by the 2nd in its right rear, the 1st being still further in rear on the right of the 2nd. Before long, however, when most of the companies had extended, the 3rd and 4th companies got in between the 2nd and 3rd battalions and remained there for some time. By the time the foot of the ravine, which was dead ground, had been reached companies and sections had got hopelessly mixed, for under cover of the dead ground order was restored *as far as possible*, and the packs were taken off. In the further advance up the eastern slopes the extension of the regiment must have been very considerable, for it occupied a front of 1,400 yards. Even under favourable circumstances this extension would have rendered any combined movement a matter of great difficulty, and one can well imagine that the wooded country, combined with the steep ascent out of the ravine, led to the regiment being frittered away in a series of independent fights by companies and sections, which barely maintained any tactical cohesion, and were absolutely unaware of what the men in their own regiment and in their immediate neighbourhood were doing.

As the various companies reached the eastern edge of the wood they saw in front of them a perfectly open slope, the crest of which appeared lined with shelter trenches. The distance these trenches were from the wood would appear to be about 880 yards. A fortified group of houses (Point-du-Jour) was also noticed, while away to the left a large farmhouse (St. Hubert) appeared artificially fortified. With the exception of the troops at St. Hubert there were no troops in advance of the crest line, so that on this portion of the battle-field, least, there were not any tiers of fire.

As no objective had been specified, these companies were in a most unfavourable position, none of their Commanders knowing what they were intended to do.

The attack of the 30th Brigade was made on, and north of the main road.

Two companies of the III/67th were on the road and one south of it to connect with the 33rd Regiment. The II/67th had two com-

panies in columns of half sections on the road, two extended on the left, the 8th Jaeger prolonged the line to the left, and the 28th extended still further to the left. This latter regiment was in two lines, the flank companies of battalions forming the second line. They were in column of half battalions. The 12/67th was on the extreme left. The 30th Brigade on the left and the 33rd Regiment (29th Brigade) on the right reached the eastern edge of the woods at about 2.15 P.M. The former brigade occupied a front of about 1,100 yards.

By the time it had reached the edge of the wood, the order of several of the companies had changed considerably.

The 3rd and 4/67th, originally north of the road and on the left rear of the III/67th, were now in a hollow 250 yards to the right front of the above-mentioned battalion.

The advance of the artillery to the position east of Mogador was made at about the same time (2.15 P.M.) Their fire was so efficacious that by about 3 P.M. the hostile artillery was totally silenced, and the Germans were able to turn their guns on the infantry manning the shelter trenches. Even if the effect of the fire could not be clearly seen, it might be inferred that it would be a matter of some hours before the French infantry were thoroughly shaken, and under those circumstances it was necessary that steps should be taken to ensure the guns having a sufficient supply of ammunition.

Unfortunately this was not done, and the Germans had at times to cease firing, and it is but too probable that this constrained inactivity on the part of the guns occurred at some of the most critical periods of the fight.

The III and I/28th would appear to have been the first to attempt to make a further advance north of the main road. Starting from the edge of the wood, the battalions made an advance over the open slope against the Moscow heights in company columns. The enemy's fire soon drove them back. The fire had scattered the men of the various companies in every direction, and it was with difficulty that various small groups could be collected together and induced to hold on to the eastern edge of the wood. A portion of the men sought refuge in the hollow of the ravine, either under the pretence of being wounded or of carrying wounded men to the rear.

To return to the 33rd Regiment. South of the road the III/33rd and 3 and 4/33rd worked off to the left, probably under cover of the hill towards St. Hubert, leaving a gap of over 700 yards between themselves and the remainder of the regiment on the right. A portion of the 5/33rd and 8/33rd occupied the gravel pits about half a mile south of St. Hubert, while the 6th and 7th companies proceeded to attack Point-du-Jour. The 1st and 2nd companies occupied the western extremity of the big quarry without opposition. The 6 and 7/33rd advanced by rushes to within about 350 yards of Point-du-Jour, but their losses were so severe that they fell back, and, once under shelter of the wood, nine-tenths of them did not come into action again. (This account differs from the one in the official, p. 89.) General von Goeben noticed from Gravelotte what had

occurred, and sent the other regiment (60th) of the brigade along the main road. By 3 P.M. the gap between the two portions of the 33rd had been filled by the III/60th.

It was about this time that St. Hubert was captured. From the account given in the Prussian official (p. 87) it is possible that a false impression might be conveyed. It is a fact that there were no senior Officers on the spot to conduct and lead the assault, and though the men may have rushed the farmyard of their own account, the impulse was undoubtedly given by the arrival of the 60th. Experience has proved that under conditions similar to those which existed near St. Hubert the approach of support gives an impulse to the firing line, causing it to make another effort to accomplish the task originally allotted to it, before the fresh supports have had an opportunity of getting merged in the firing line. This is what occurred at St. Hubert.

The number of companies of the 60th that gave the original firing line the impulse that carried St. Hubert amounted to ten. Captain Hoenig is of opinion that one company properly directed might have been sufficient. That may be. It is, however, his view as to what constitutes a properly led company in a charge that we propose giving. He states that the men must be kept well in hand, Officers in front, on the flanks, and *in rear*. Probably experience has taught the Germans that Officers under certain circumstances must drive as well as lead their men.

Our readers will remember that in the orders issued by Von Moltke the attack was to take place from the Bois de Vaux as well as from Gravelotte. We will now consider what steps were taken to fulfil this order. At 3 P.M. orders were sent to the 26th Brigade to advance from Ars against Vaux and Jussy. The official account (p. 86) dismisses the action of the infantry of the VIIth Corps with a few words, so we must look to other sources to discover how much or how little they did. The aimless manner in which two of the brigades, forming each a portion of different divisions of the VIIth Corps, were distributed has already been mentioned. In consequence of this, none of the units composing these brigades knew what was wanted of them. The least that might have been done, more especially as the 16th Division was acting as a reserve at Gravelotte with the IInd Army Corps not far in rear, would have been to have got the 25th and 28th brigades together, and then some decision might have been arrived at as to their future action.

The instructions which were sent at 12 noon to Von Steinmetz, directing him only to bring his artillery into action at first, did not cancel the orders of 10.30 A.M.; they only delayed their execution. Von Steinmetz should have given orders to the Commander of the VIIth Corps to make the needful preparations to conduct an attack in support of the 15th Division, from the Bois de Vaux. Instead of being near Gravelotte throughout the action, General von Zastrow should have been opposite the Rozerieulles quarries, near the eastern edge of the wood, by 3.30 P.M. Had such been the case he would have been informed of the first capture of the quarries by the 33rd,

which took place at about 3.33 p.m., whereas, as matters stood, he remained ignorant of either the first or second capture of the same.

If troops are fighting in a wooded country, separated from their Chief by a ravine, and over 2,000 yards away from him, it is the business of the latter to ensure that communication is kept up between him and the troops in front. This did not occur, and, with the exception of the 26th Brigade, the whole of the infantry of the VIIth Corps was wasted, and this under the eyes of Steinmetz and of Zastrow. By 2.30 p.m. the troops might have been massed near the Mance mill, the left of the I and II/53rd and 7th Jaegers been reinforced, and the quarries attacked from this position, which was far from unfavourable. With the quarries captured and held in strength, the battle was decided on that flank. This was perfectly feasible, for the weak detachment of the 33rd remained in possession of their south-western extremity for about three-quarters of an hour, in fact, till after 4 p.m. This would have been the right course to have pursued, and it would have been in accordance with the spirit of Von Moltke's morning orders. The infantry were almost wasted; the greater portion of it acted as escort to the artillery. An artillery line like the one the Germans had near Gravelotte can protect itself, more especially if it has mastered the hostile artillery. Nothing of any consequence occurred on the German right, and as a result the French were able to bring nearly all their forces near Point-du-Jour against the 15th Division.

Captain Hoenig brings a very strong indictment against General von Steinmetz, whether justifiable or not we are unable to say. We reproduce it, however, for it is interesting as a study on the influence manner and temper on the part of people in a responsible position may have on their subordinates. After mentioning the perfect calmness of Von Goeben, who dismounted to ease his horse and remained perfectly still, we are told that the expression on Von Steinmetz's face showed that he was in a violent temper. It is true he spoke but little, but he walked his horse up and down, and when any instructions were given, his manner was gruff and unpleasant. Steinmetz would never receive the advice of anybody; his obstinacy was only equalled by his vanity. There was no harmony between him and the members of his Staff; they did not work with pleasure for him, and the military absolutism to which they were subjected acted as a dead weight on the best of them.

To return to the situation of affairs with the 15th Division at about 3.30 p.m. At this hour this division appeared like a wedge jutting out from the general line of battle, about 400 yards from the main position of the French, and exposed to a continuous frontal and flanking fire. It was split up in a series of small groups without fresh supports in rear. At first sight it may appear incomprehensible that the numerically superior enemy did not drive the whole division back into the ravine and recapture St. Hubert. We shall not be far wrong, however, in attributing the holding power this division possessed to the vast superiority of the German artillery.

From about 1 p.m. to 3.30 p.m. the 15th Division fought with about

10,000 rifles against 16,000 belonging to the French 2nd and 3rd Corps, but they were supported by 156 guns against 90. Of these 10,000, not more than 6,000 rifles remained in the firing line; 2,000 or so were killed or wounded, and another 2,000 had lost their way in the woodland.

General von Goeben could not tell exactly how this division was actually situated, but his shrewd judgment told him that all its offensive powers were spent.

He could see the Mance ravine, in rear of the division, richly studded with men of all sorts, some with rifles, some without; some wore their headdress, others did not. A few of these men were collected together by some senior Officers; the majority, however, concealed themselves in the woods. The detachments that were collected were sent forward into the fighting line, but, as nearly all of them were without Officers or non-commissioned officers, very few reached it.

This wooded portion of the field concealed a large number of stragglers, who only rejoined their corps on the morning of the 19th. The men came from all parts of Prussia. The 33rd were East Prussians, the 60th Brandenburgers, the 28th Rhinelanders, the 67th Magdeburgers, and the 8th Jaegers, also came from the Rhine; they one and all, however, fell victims to the temptation a wood has for humanity under certain circumstances. From the above fact may we not infer that Officers are as necessary in rear of the fighting lines as in front?

The leadership on the part of the Commanders of the 29th and 30th Brigades was in the main good. The Commanders of both brigades kept themselves in constant communication with their divisional and corps leaders. The tactical success obtained in securing possession of the far edge of the wood is due to the leadership of Brigadiers and Colonels. Whether the move of the II/28th northwards was intentional or not, it is impossible to say, but it was, tactically speaking, a most useful one. This battalion kept up a constant flanking fire against the French, and it is a question whether the remainder of the brigade could have maintained their position without this valuable assistance.

The troops themselves committed the error of crowding together when they should have been extended, namely, at the far end of the defile formed by the main road, opposite St. Hubert. Probably in an enveloping movement it will also be impossible to prevent something similar occurring, but one should always endeavour to prevent it. As a matter of fact, the troops extended at the wrong time, for on entering the woods they were greatly scattered; inside the wood they got together, and reached the far edge in little densely packed groups.

In the main, the various attacks were conducted by companies, which generally managed to work in concert with those on their right and left, in spite of heavy losses. The conduct of the four companies of Jaegers is worthy of note. They were able to maintain within themselves sufficient energy to assault St. Hubert, though they were all absorbed in the firing line, and had no supports near

them. They had prepared the assault by an effective fire, and when in possession of the farm, they remained in it until nightfall. Their losses were not inconsiderable, for they amounted to 12 Officers and 197 men. One fact is of especial interest for us. Although the units composing the 15th Division had only been brought together on mobilization, and, as we have seen, came from all parts of Prussia, no friction or tactical disadvantage seems to have resulted thereby. On the contrary, everything appeared, all things considered, to work smoothly. The III and I/28th seem to have contributed less than any of the others to the success on this part of the field. The ground over which they had to attack was undoubtedly unfavourable for them: their losses were, however, not very great, amounting as they did to 22 Officers and 341 men. The impression conveyed is, that the dissolving influence of the woods rendered it exceedingly difficult for the Officers to keep their men together, and to lead them forward to the attack.

The advances made by the 60th and 28th against the main French position after the capture of St. Hubert would have been better left alone. Single companies could effect little or no good, and absolutely nothing could be expected of them, if the advances were made without an adequate fire preparation. This was not done. It is true that some companies got to within 250 yards of the French, but their opponents' fire was so overwhelming that they were forced to fall back, and were only brought to a stand at the eastern edge of the wood. Advances made in that fashion against an overwhelmingly powerful enemy naturally lead to the troops attempting them being driven back. Experience has shown that it is during the retirement that the heaviest losses are incurred, and the tactical value of the troops reduced.

This independent procedure on the part of individual companies must be prevented, especially when no definite objective for attack has been pointed out, as was the case here. Fortunately for the Germans their opponents contented themselves at that period with a passive defence of their position: should the enemy, however, make a counter-attack at the proper moment, as the French did later on, a panic is the invariable result, and the fighting value of the troops is used up. This is due, not so much to the material losses incurred, as to the moral effect of a successful counter-attack made at the right moment. Though these attacks which were made by companies up till about 3.30 p.m. may be explained, it is difficult to see how similar attacks made right through the day by nearly every regiment engaged near St. Hubert can be excused. The Prussian tactics at that time were obsolete, and the series of errors they committed bear a striking resemblance to the series of attacks made by them against the French at Jena.

They attempted shock tactics without paving the way for the same by an adequate amount of infantry fire; in fact, one might say that no preparation by fire was ever made, for the Germans never got within effective range to do so. Shock tactics can only be expected to succeed when the previous rifle fire has proved effective.

At about 3 P.M., it appeared to General von Goeben that the energy of the 15th Division was exhausted, and that to enable it to maintain the position it had won against a possible counter-attack, it would be necessary to reinforce it; he consequently decided to send a brigade of the 16th Division forward as a support.

At the same time, General von Steinmetz decided in his own mind that the enemy was contemplating a retreat, and issued orders, not for an attack against the hostile position, but for a pursuit. The result to the Germans was disastrous.

It is worthy of note that Steinmetz, Zastrow, and Goeben had exactly the same means of judging the effect the attack of the 15th Division and the artillery fire had had on the French, yet the two former arrived at a diametrically opposite opinion to the one arrived at by the last-named Officer. Steinmetz and Zastrow appeared so confident in the correctness of their conclusions that each one seemed to outbid the other in endeavouring to obtain for themselves the credit of a victory won before the very walls of Metz!

The orders General von Steinmetz issued at 3 P.M. were as follows: "The 1st Cavalry Division will at once pass over to the heights near Point-du-Jour; the regiment forming the advanced guard, supported by the fire of the batteries of the VIIth Corps, which will accompany the division, will, taking the direction of Moscow Farm, throw itself on the enemy, who is in the act of retiring; its attacks will terminate on the glacis of Metz. The other regiments will all act with it." ("History of the 4th Lancers," p. 95.) The other order issued was that the 26th Infantry Brigade was to advance from Ars on Vaux.

Such was General von Steinmetz's idea of a combined frontal and flank attack. Simultaneously with the above orders issued by the Commander of the 1st Army, General von Zastrow ordered the whole of the artillery of the VIIth Corps to take position on the heights on the opposite side of the Mance ravine, south of the main road. To protect this artillery line the 27th Brigade was directed to advance as far as the *western* edge of the wood. Captain Hoenig informs us that the Commander of the artillery of the VIIth Corps could hardly believe his ears when he heard the order. He attempted to point out the inadvisability of such a procedure, but his remarks were cut short by his superior Officer, and he had to submit. Recognizing that some disaster must result if the order were carried out, and deeply imbued with the sense of his responsibility, he had recourse to stratagem. While apparently riding down the line to convey the orders received, his Staff Officers whispered to the Field Officers in charge of divisions that they should manage to do something to make it appear that they could not limber up at once, in order that a few minutes might be gained. These few minutes might save them. It was only a question of creating a slight delay. As a matter of fact this stratagem saved many of the batteries, but not all. The 3rd horse, 3rd light, and 4th light batteries of the VIIth Corps had been unable to find space to come into action; they were consequently ready to move off at once, and any delay was impossible in their case; they started off, and as they were

nearer to the defile than the 1st Cavalry Division, they entered it in front of the cavalry. Let us picture to ourselves how matters stood on this oft-mentioned road to Metz. Wire had been placed across it by the French; the infantry had partially removed the obstacle but not entirely. St. Hubert had just been stormed; the 60th and 33rd had made their unsuccessful onslaughts against Point-du-Jour; hundreds of wounded were trailing back along the road, accompanied by still greater numbers of men who were assisting them. The 29th Regiment, forming part of the 31st Brigade, which Von Goeben had sent as a support of the 15th Division, was also advancing along the road. The infantry were unaware that masses of cavalry and artillery were following them, the cavalry were unaware that the infantry and artillery were both exposed to hostile fire while still in the defile, and all three arms were unaware that a strong stream of men out of action was coming towards them; the troops moving to the front were hurrying on as fast as they could.

On one road, swept by a hostile fire, were found troops belonging to five different commands. The 29th (31st Brigade) immediately alongside the regiments of the 27th Brigade, the 1st Cavalry Division and its battery, also the four batteries already named, there were besides the 9th and 15th Hussars, the former belonging to the VIIIth Corps, the latter to the VIIth. Both these two regiments were working independently, each of them fighting their way to the front as best they could. The 31st Brigade was intended to reinforce, the 1st Cavalry to pursue, the 27th Brigade to form a sort of reserve, the artillery to support the movement. For a military movement to meet with success, three things are necessary: order, simplicity of intentions and clearness in the instructions; not one of the three was to be met with in this case. What a hell that road must have appeared to the crowds massed on it!

Above them a dense cloud of smoke through which columns of fire from the burning farms of Moscow and Point-du-Jour might be seen at intervals; behind them the thunder of 144 guns, and in the ravine itself masses of cavalry, artillery, and infantry, crowding and jostling each other! Those in rear trying to force their way to the front, the advance of those in front getting shorter and shorter under the pressure of the hostile fire. Infantry coming from the front in all sorts of conditions, some wounded, others because their moral had failed them. When we look upon this picture need it surprise us when we hear that later on the men's nerves were unequal to bear the strain imposed upon them, and that the movement ended in a catastrophe?

The orders conveyed to the 1st Cavalry Division should be made "famous." A glance at the map must have informed General von Steinmetz that even had his premises been correct, the cavalry pursuit must have terminated, not on the glacis of Metz, but in the Chatel Valley. It was a notorious fact that Steinmetz expected that those under his command should do something brilliant; any ordinary action had no longer any charm for him. Now there is

nothing wonderful in an attack of 2,200 yards. The distance to Metz was about 7,000 yards, and the nature of the ground such that a squadron could with difficulty have found room to attack over it. Energy can degenerate into a disease.

As the artillery and cavalry trotted through the hollow, dense clouds of dust, rising high, informed the expectant foe that something extraordinary was occurring. The volume of dust became so dense that eventually the troops could only hear and feel each other. Then the uncomfortable feeling produced by the absolute cessation of artillery, and practical cessation of infantry fire, as the head of this mass commenced to ascend the road on the far side. The four batteries already mentioned and the Cavalry Division trotted past the 29th. The batteries of the 14th Division had lost so much time in limbering up that they were some distance in rear; they consequently remained limbered up, somewhere south of the main road. The Cavalry Division advanced in the following order:—

4th Lancers, 2nd Cuirassiers, 9th Lancers, the battery of horse artillery. The 2nd Brigade followed, consisting of 8th Lancers, 3rd Cuirassiers, and 12th Lancers.

While this division was advancing as best it could, the 9th and 15th Hussars cut into the column, and compelled the rear of it to halt; and while these thirty-two squadrons were wedged in on the road, two ammunition wagons, the horses of which had bolted, and which belonged to one of the batteries which had in the meanwhile come into action near St. Hubert, came flying down the road from the front. For some minutes it was absolutely impossible to move in any direction; the whole of the cavalry were practically incapable of fighting. When the 4th Lancers eventually attempted to form up near St. Hubert, the unfortunate troops were met by a hail of rifle and artillery fire. The crowding, pushing, and shouting increased; everyone felt the defencelessness of their condition, and the inevitable approach of some catastrophe. Suddenly from the rear a trumpet sounded "Threes about." The whole division, with the exception of the 4th Lancers, retired to Malmaison. General von Hartmann, commanding the cavalry division, had recognized the impossibility of carrying out his instructions. This condition of affairs had, however, lasted half an hour, and it was not until 4.30 p.m. that the division formed up near Malmaison. ("History of the 9th Hussars," p. 162.)

When the tail of the cavalry column began to halt, the artillery of the 14th Division had recognized that it was impossible for it to cross to the opposite heights by the main road; it consequently returned to its old position, whence it resumed its fire. After remaining inactive for half an hour, it had to range itself again. It was essential to the success of General von Steinmetz's plan that the hostile artillery and infantry fire should be kept down as much as possible, and not a German gun should have gone out of action. We may attribute the sudden heavy and destructive opening of both artillery and infantry fire by the French to the fact that a large portion of the German guns had ceased firing, either because

they were limbering up, or because they had limbered up in obedience to the orders received.

The four batteries which crossed the ravine went forward at a trot; it was consequently impossible for the Commander of the Corps Artillery to get sufficiently ahead to select a suitable position for them to come into action. When he reached St. Hubert, he recognized the impracticability of the orders he had received. However, he endeavoured, assisted by the battery Commanders, to select the best position possible. The garden wall, about 2 feet high, offered but a slight protection against the enemy's fire. If the artillery attempted to avail itself of the cover it gave, and came into action against Moscow, its right flank was enfiladed at a distance of 400 yards from Point-du-Jour. If it came into action against Point-du-Jour, its left flank was enfiladed from Moscow. It is true that the artillery might have come into action against both the above-mentioned places, by unlimbering on each side of St. Hubert, but artillery consists of men and horses besides guns, and we know from experience that when horses are being struck down by infantry fire the best intentions are frustrated. One can no longer do what one wants to do—one can only do what is possible—and unlimber the guns coming into action as best they can at the spot one has managed to reach with difficulty. In this case a spot south of St. Hubert was reached. From thence they fired in the direction of Moscow. Their fire must have been effective, for though the French infantry made at least twenty forward movements, they never managed to push them to a real attack against the Germans at, and north of, St. Hubert. Even if the artillery of the VIIth Corps had succeeded in unlimbering near these batteries, the position could never be considered a good one, for, owing to the shape of the ground, it was only possible to shell the slope in front, where the French skirmishers were posted, and not the top of the plateau, where their formed bodies were. Owing to the, comparatively speaking, low ground on which the guns were, the larger masses of troops could neither be seen, nor their position guessed at.

The action of the four batteries is described at length in the official account, and as Hoenig's account does not differ in any essential points from the official version, their action need not be further considered.

When the Commanding Officer of the 4th Lancers approached St. Hubert, the 4th heavy battery, which was at that moment on his left, prevented his forming up to attack, in the direction of Moscow, as originally ordered, for to do so he must have halted while the 4th battery moved out of his way. Remembering the masses of cavalry which were behind him, such a course appeared most unadvisable; he consequently chose the lesser evil, and, changing the objective, determined to front towards Point-du-Jour. While doing so, he heard the trumpet sounding the "retire." The 4th Lancers were under a terrible fire, and a retirement under those circumstances appeared to the Colonel most injudicious. It was, however, impossible to remain where they were. The "gallop" was consequently sounded, and the regiment made straight towards the gravel pits. When within

200 yards of the same, it formed into line, fronting towards Point-du-Jour, about 400 yards from the hostile shelter trenches. A slight dip in the ground afforded some cover, and most of the enemy's bullets went high, so the losses incurred were, comparatively speaking, slight. The Colonel remained in the same position for about half an hour, and then, as there was absolutely nothing for them to attack, he retired his regiment, and rejoined the cavalry division at Malmaison. ("History of the 4th Lancers," p. 96.)

The moral effect of the failure of the combined cavalry and artillery attack on the French must have been considerable, not only on the troops themselves, but on the different Staffs which happened to be near Gravelotte; but the physical and material effects were no less great. While the endeavour to push through the Mance ravine and beyond it was being made, the greater part of the artillery of the VIIth Corps had to cease fire, and by 5 P.M. that corps had lost the use of two batteries, which were practically out of action, near St. Hubert. One had lost its way, and got stuck in the soft ground of the ravine (the 4th heavy), three other batteries could not find room to resume their old positions; so that from 5 P.M. the VIIth Corps was 36 guns weaker than it had been earlier in the day.

The situation of affairs on the French side was very different. General Frossard had noticed how the German batteries near St. Hubert had suffered, and he had an infantry reserve of three battalions near Point-du-Jour, prepared to take advantage of any favourable moment. While the 4th Lancers were retiring, these troops, forming a line extending from the quarries to a point about 300 yards south of the main road, attacked straight to their front. This attack was conducted with an extraordinary amount of vigour and rapidity, and met with a complete success. The quarries were recaptured, the men bolting back towards the wood, shouting, "We are surrounded." The gravel pits were also lost by the 33rd. The French in their advance got beyond the 3rd light battery; they, however, ignored both it and St. Hubert, and the mob on the main road, which offered an easy prey. The 33rd were scattered; portions of them which endeavoured to make a stand on the eastern edge of the wood were fired at by the 60th in the confusion of the moment, and both regiments then bolted indiscriminately down the hill. The Staff Officers at Gravelotte, who were already unfavourably impressed by the return of the cavalry, when they saw these men coming out of the wood panic-stricken, without arms or head-dress, cast many an anxious glance towards Vionville for reinforcements. The infantry bullets got nearer and nearer; several of them reached Gravelotte, and struck the gunners south of the village. The French counter-attack was not, however, supported with sufficient vigour from Moscow, and the danger eventually passed away.

The condition of affairs at 4 P.M. was, however, very critical for the Germans, and it may help us if we mention the positions of the various troops at that hour. On the extreme left, III/69th and 8, 7/69th (31st Brigade), in action against La Folie and Leipsic. 6, 5, and I/69th, resting their right on the main road, had got mixed

up with the 28th (30th Brigade), and fronted towards Moscow and St. Hubert. The extreme left, and the centre near St. Hubert, had consequently received the desirable reinforcements. The 29th, which was the other regiment of the brigade, had got into some confusion, owing to the masses congregated on the main road, and only the 1st and 4th companies were able to reinforce the 15th Division simultaneously with the 69th Regiment. The 1st company, after a fruitless endeavour to advance against Point-du-Jour, had turned towards St. Hubert; the 4th, after an equally unsuccessful endeavour, remained near the 4th heavy battery. As the road got less encumbered, the remaining companies of the 1st battalion came up, one made for St. Hubert, the other remained in the quarries lying to the west of the farm. Not much use could be expected from this reinforcement, as it only came up in driblets, and each driblet as it came up attempted the same impossible feat that its predecessor had failed in accomplishing. Each company made an independent assault over the open ground, without endeavouring previously to establish itself where it could pour in an effective rifle fire, and thus prepare the way for an assault.

Had such a course been adopted, had a heavy fire been kept up from those positions, and reserves been brought up close to them, then, at least, some of the conditions necessary to success would have been satisfied. Such a course was feasible; the action of the 3rd light and 3rd horse batteries prove that. After the I/29th had been decimated south of St. Hubert, the III/29th attempted the same thing, north of the farm against Moscow, and met with identically the same fate. When the energy of this battalion had been expended, the II/29th arrived, and endeavoured to assault over the ground which had proved fatal to the other two battalions of the regiment, one company going in one direction, one in the other. The Commander of the regiment who had failed a few minutes before in leading four companies to the assault, attempted to succeed with *one*. The other two companies attempted nothing, but made for St. Hubert. The Germans were able to fight by battalions, but to fight by battalions or regiments appeared beyond their task. Hoenig attributes this to their never having practised fighting formations by battalions or regiments in peace time. The manner in which troops lost their direction in moving through a wood may be fitly illustrated by the action of the 10/69th. From the left wing of the brigade it had wandered to the extreme right, and arrived with others at St. Hubert; its march was the counterpart of the march of two companies of the 33rd in the woods, south of the main road, earlier in the day.

Somewhere about the same time that the 2 and 3/29th made their attacks, the 39th (27th Brigade), which had crossed the ravine south of the main road, came into action. The regiment occupied the ground between the St. Hubert quarries to about half-way towards the gravel pits. The reinforcement it brought checked the French counter-attack, of which we have already spoken, and eventually compelled the enemy to retire. The VIIth Army Corps had, however, invaded the zone in which the VIIIth were fighting, and

though it is true that the artillery of the VIIth Corps had done the same, the tactical disadvantages of artillery being mixed up with strange units are not as great as when this happens to infantry. To retain sufficient power wherewith to deal an effective blow, every endeavour must be made not to mix the larger units of infantry. The intrusion of this fresh battalion among the infantry of the VIIIth Corps, though it checked the French, led to consequences which were detrimental to the general object in view. At 4 P.M. the conglomeration of units forming the garrison of St. Hubert was bad enough, but by 5 P.M. there were portions of seven different regiments crowded in the place. A mixed crowd of men, such as were to be found at St. Hubert, cannot be commanded to any good purpose, and the amount of power which is wasted is very considerable.

Up to 3 P.M. neither General von Steinmetz nor General von Zastrow had grasped that the scattered infantry of the VIIth Corps should be formed up, ready to make an attack from the Bois de Vaux. Two hours later nothing had been done in this direction. Yet there were $10\frac{1}{2}$ fresh battalions available for that object. They were, however, utilized to no good purpose, while all the measures taken to ensure the pursuit of the French only led to a series of defeats. The course which was both correct and practicable was not followed, and had the misdirected energy expended in pursuing the wrong and impracticable course been employed in the flank attack from the Bois de Vaux, it must have met with the success it would have deserved.

By about 5 P.M. the bodies of men and horses, together with overturned guns and limbers, had made any movement on the high road somewhat difficult, and columns of infantry amounting to $2\frac{1}{2}$ regiments would appear to have lined it from St. Hubert back to the edge of the wood for over a couple of hours, forming a perfect catch for the bullets which the French poured into them. It did not occur to anyone to retire this mass, which impeded the deployment and movement of troops, both north and south of the high road, re-form them, and then lead them again to the front in some order, which would have enabled them to have been employed with effect.

It seems incomprehensible that such things could have occurred, since for years one of the most popular tactical schemes practised in the Prussian Army was the passage of a defile; yet at the critical moment everyone from General to Lieutenant would appear to have forgotten all the rules which were supposed to have been drilled into them.

The defile was actually lengthened by a living wall of men crowded up together, the exit out of the hole was blocked, and by 7 P.M., when the French made their last offensive stroke, these troops' moral was so used up that they no longer knew whether friend or foe was in front or rear, and when the 3rd German Division crossing the Mance ravine, with drums beating, advanced up the eastern slope, and unfortunately fired into them, the whole mass fell to pieces like a pack of cards, and utterly bereft of their senses, victims of a wild panic,

the picture they presented, as they rushed shouting and howling to the rear, is one which military history has seldom presented to us.

While the Germans were thus wasting their strength, the French skilfully availed themselves of the opportunities which had been afforded to them. The troops were re-formed, the positions occupied by fresh ones, ammunition replenished, and everything done to maintain and increase the moral of the defenders.

Though, as we have seen, Captain Hoenig does not scruple to point out the mistakes made by the Commander of the 1st Army, and by others, he endeavours to treat General von Steinmetz with justice, and points out that in the official account of the battle, an attack is distinctly made against him—even in cases where he was not to blame.

Steinmetz, at 10.30 A.M., was ordered to commence the attack simultaneously with the IIInd Army. He was then ordered only to show his artillery *at first*. This order was received at 1.15 P.M. It must always be borne in mind, however, that the orders of 10.30 A.M. were the important ones, and the orders under which the action was to be fought. Subsequent instructions were only explanatory, and did not nullify the original orders. The instructions received at 1.15 P.M. premised that the fighting audible at 12 noon, near Verneville, was a desultory fight. When, however, these instructions were received, it was clear that the artillery fire audible on the left was not the result of desultory fighting, but that a general action was taking place. These instructions were, consequently, nullified, their premises at the time of reception being false, and the original order of 10.30 resumed its full force; and, as Steinmetz received no fresh ones, he was bound to act on the original order received, and he must be held justified in all that he did up to 3 P.M.

The official account does not treat Steinmetz fairly. The serious faults committed by the IIInd Army, such as the faulty reconnaissance made, the crossing of the Guards and XIIth Corps, are glossed over: though both these faults disturbed Moltke's plans materially, while attention is sometimes even drawn by means of italics to mistakes attributed to Steinmetz.

It is incorrect to state that the main idea conveyed in the orders was that the right wing of the Germans was to "hold the main forces of the adversary in check until the left wing of the IIInd Army had thoroughly cleared up the situation on his lines of retreat, and in the event of the French forces making a stand to the west of Metz until it had surrounded their left flank from the north" (p. 103).

Undoubtedly such was Moltke's idea. Steinmetz, however, was not informed where the French right really stood, nor when the IIInd Army made its simultaneous attack, and he could, under the circumstances, only judge that the attack was being made by the heavy fire audible on his left.

At about 4.30 P.M. the Royal Headquarters were in rear of the right wing of the 1st Army. Up to that time General von Steinmetz had reported to Headquarters what had occurred in his army. First, the success of the artillery duel against the batteries near Point-du-Jour, then the capture of the woodland, next the capture of St. Hubert,

and, finally, the advance of his cavalry and artillery over the Mance Valley. The orders for this last move were issued at 3 P.M.; at that hour the Headquarters were still near Rézonville; it would, consequently, appear that they themselves expected the decisive result to occur near Gravelotte, and had for that reason selected the bad position they took up, so as to be close at hand when the decision was arrived at.

If, as we are officially informed, anything more than a display of artillery on the part of the 1st Army was contrary to Moltke's intentions, why, as the above-mentioned reports reached him, did he not send Steinmetz further instructions telling him to keep the main forces of his army back? How is it possible, under those circumstances, to condemn in this respect General von Steinmetz's action up to 3 P.M.?

There is another point on which the official account is misleading. On p. 110 we are informed that the action of the 26th Brigade in threatening the extreme French left caused Marshal Bazaine to divert his attention from the decisive portion of the battle-field. By that can only be meant that it caused him to keep his reserves near his left.

The 26th Brigade marched on Vaux at about 4 P.M. (p. 106), and, according to the official account itself, Bazaine had by 3 P.M. disposed of nearly all his reserves. How can these statements be reconciled? As a matter of fact, the appearance of the 26th Brigade, as well as of the German troops, on the right bank of the Moselle, had no particular effect on the battle. Bazaine made no alterations on account of the appearance of these troops, beyond reinforcing Lapasset's brigade with a couple of batteries of Guard Artillery, and bringing some artillery near St. Quentin into action.

Judging from the official account, it is not clear what orders were given to the 26th Brigade.

On p. 93 we read that, at 3 P.M., orders were sent to this brigade to attack the extreme left of the enemy and march on Vaux. These orders were received at 4 P.M., and by 6 P.M. the brigade had forced back the skirmishers of Lapasset's brigade and occupied Jussy, which was feebly held, and still more feebly defended, and with this its activity ceased. This action could hardly be considered in the light of an energetic attack on the enemy's left wing. This seems to have been recognized, for we are suddenly told (p. 109) that General von der Goltz, in accordance with the spirit of the instructions received from the Headquarters of the 1st Army, was intended to help the Prussians in making the attack from the Bois de Vaux. One naturally asks, what instructions did General von der Goltz receive? On p. 106 we only hear of one—and none others are mentioned afterwards. On p. 109 we suddenly hear of instructions which, under the circumstances, would have been absolutely correct ones to give.

According to the account given on p. 109, General von Steinmetz did intend attacking from the Bois de Vaux. This view, however, falls to the ground when we consider the arrangements actually made by General von Steinmetz. He made no arrangements for an attack

from the Bois de Vaux: on the contrary, at 4.30 P.M. he requested the Royal Headquarters to direct the IInd Army to assist him by operating against the right wing of the French ("Moltke's History of the 1870-71 War," p. 175, German version).

The official account, in dealing with the southern portion of the battle-field of Gravelotte, is guilty of several inaccuracies and contradictions. It informs us (p. 111): "That the original task of the Ist Army, that of drawing the adversary upon itself, was fulfilled, and by the impetuosity of the troops, to a certain extent, exceeded. For, whilst the VIIth Army Corps, in accordance with its former instructions, had in general limited itself to maintaining those places which it had originally occupied, the VIIIth had, with the capture of St. Hubert, moved close up to the enemy's main position. The French must, therefore, have expected, at any moment, an attack upon their *left* wing, and kept, in consequence, their reserves in rear of the centre until it was too late to support the *right* wing."

That was not the original task allotted to the Ist Army. Its original task was to attack from the Bois de Vaux and Gravelotte simultaneously with the IInd Army. It was not the impetuosity of the troops which caused the instructions to be exceeded; it was the orders for the pursuit, given by General von Steinmetz and by General von Zastrow, which caused the great loss of life. The capture of St. Hubert was essential, whether the Ist Army was operating on the offensive or on the defensive. Artillery fire alone will neither hold an enemy in check, nor draw the enemy on; an effective defence cannot be obtained by artillery alone: infantry must be put into the fighting line for that purpose. It is not a fact that Bazaine kept his reserves till 5 P.M. in rear of the centre. He had disposed of nearly all of them by 3 P.M.

The Royal Headquarters slowly made their way towards the German right wing, and at about 5 P.M. they established themselves south of Malmaison. Here Count Warlensleben, Quartermaster-General to the Ist Army, reported verbally how matters stood with that Army. Shortly afterwards, Lieutenant-Colonel von Brandstein brought the Headquarters the first definite information about the position of the French right wing. From his report it was evident that the dispositions made by the IInd Army were absolutely in accordance with the spirit of the intentions of the Royal Headquarters. It would have been better, however, if the Royal Headquarters had known from their own knowledge what was occurring on the left—or at least had selected a better position for themselves. Up to 5 P.M. they had been too far in rear; now, though well up to the front, they were in rear of one wing, and it took a long time to communicate with the other. Though, owing to the activity and initiative of Prince Frederick Charles and the then Crown Prince of Saxony, this disadvantage was not severely felt, yet, even up to the end of the day, great uncertainty prevailed about the progress and issue of the battle as far as the IInd Army was concerned.

As long as one had reasonable grounds for expecting to come across the enemy somewhere between Rézonville and Ville-sur-Yron,

the selection of the position near Flavigny might be understood, but once the orders of 10.30 A.M. were issued, Flavigny was no place for the Royal Headquarters to remain at, and after the opening of the battle, any further stay near that place became a blunder. Though the Headquarter Staff of the Commander-in-Chief should not interfere with dispositions made by subordinate Commanders without some excellent reason, it is highly probable that if the German Commander-in-Chief had been near Malmaison at about 1.30 P.M., matters would have taken a different course in the 1st Army. The assumption that the enemy was retreating at about 3 P.M. would, undoubtedly, not have been shared, and the consequent arrangements for pursuit would have been stopped. The late appearance of the Royal Headquarters on the battle-field had already met with a severe punishment, though worse was yet to come.

Shortly after 5 P.M. it was noticed from Malmaison that the hostile infantry fire had considerably decreased, while at times the artillery fire ceased entirely. The correct inference was drawn that it was due to a state of exhaustion on the enemy's part, and it was given to be understood that the King of Prussia desired the simultaneous attack, and the consequent dispositions for its successful issue to be made.

An attack made by large masses presupposes that certain arrangements have been made, such as suitable rendezvous spots and battle formations for the various units, as well as a fair knowledge of the enemy's strength and positions. To use the attacking troops to the best advantage, roads and means for deployment are necessary; the objectives of attack should be clearly known. All these are necessary conditions; they are doubly necessary when one army is to make a simultaneous attack in combination with another.

Although the attempts to break out from the Gravelotte defile against Point-du-Jour had all failed, even after 5 o'clock General von Steinmetz obstinately continued to ram his head against the French position, as he had done previous to that hour. The attraction of that high road was too strong to be overcome. Yet it is absolutely impossible to make a simultaneous attack from one road, more especially when that road forms a defile and is within range of the enemy's rifles. To have made an attack simultaneously with the IInd Army, it was at least necessary that the attack made by the 1st Army should be a combined one.

From 12 noon to 5 P.M. nothing was done to ensure this end. Several lines of advance were necessary to ensure the troops attacking at the same moment, particularly so when the orders directed that the attack should be made in front and flank, and if the means for the proper deployment of the troops failed, they should have been made. Roadways through the woods could well have been made between 12 noon and 5 P.M.; the loss to the troops and expenditure of strength in cutting them would not have been as great as they were under the actual circumstances of the fight, and by the latter hour the troops would have been prepared to attack along a long front, instead of a large proportion of them being massed on

the high road, exposed to a heavy hostile fire, which rendered it difficult, if not impossible, to establish order and cohesion among them.

Even westward of the exit from the defile matters were not much better. Officers were engaged in collecting the men together and leading them back to the fighting line. There were so few Officers available for this duty, that little could be done in this direction. The battle-field, consequently, presented an appearance which was not without its effect on the fresh troops which were brought up. Men were constantly bolting for the cover afforded by the trees, and then they stole away to the rear and hid themselves in likely places where they hoped to escape the eyes of the Officers and the enemy's bullets. This stream continued till after dark, and as fifty-nine companies were collected in and about St. Hubert, they formed, so to speak, the reservoir which fed the stream.

The French, whose fire had nearly died away, suddenly, at about 6.30 P.M., hid themselves in a dense cloud of smoke, opening a violent artillery and infantry fire against their opponents. What caused this sudden outburst? Standing on the highest ground near Point-du-Jour, one notices about half way towards Rézonville, a hollow (924 in map of Gravelotte). The French from their position could see the 3rd German Division just emerging from this hollow, accompanied by the Corps Artillery. Captain Hoenig informs us that Marshal Lebœuf frequently stated to him that the field of helmets appeared to extend from Gravelotte to Rézonville. None of the French Generals would appear to have estimated the number of these fresh opponents correctly. They were of opinion that it was the reserve army under the immediate orders of the King of Prussia, and was estimated to amount to at least two army corps; some estimated that the additional strength to the Germans amounted to three corps.

As the IInd Corps advanced in three distinct groups, this false estimate is easily explained. The French felt they were not strong enough to cope with these new arrivals; it became no longer a question of winning a victory, but of getting out of the business with honour. The only means of doing so was by gaining time; a counter-attack afforded the best means of doing so. Lebœuf and Frossard both agreed to hurl themselves with all their available troops against this reserve army at the moment it attempted to deploy out of the Mance ravine. The results will show us how difficult such a counter-attack is on the part of the defender, for, as a matter of fact, a combined counter-attack from Point-du-Jour and from Moscow did not take place. The attack was only delivered from Point-du-Jour, and there it was delivered much too soon, and it would appear that Marshal Lebœuf refrained entirely from making his attack, for when Frossard broke out from Point-du-Jour, the former had not completed his preparations; when he was ready, Frossard's offensive stroke was spent, and his troops falling back, and consequently Lebœuf did not attack. The French counter-attack was made too soon to fulfil its object, and was probably made with about half the strength

that was intended. We now understood how it was that St. Hubert was not attacked at all.

This offensive move was, nevertheless, the most vigorous one of the day; Bastoul's and Verge's divisions took part in it, and it was made both rapidly and skilfully, except that, as just stated, it was premature. About 300 yards from the most advanced shelter trenches of the French and south of the high road, were several irregular groups of skirmishers belonging to the VIIth and VIIIth Corps. These skirmishers kept up an intermittent fire against their opponents, and certainly did not expect to be attacked themselves. The sudden heavy artillery and infantry fire which fell on them made a deep impression, and before they had realized that a new phase in the fight had occurred, a line of skirmishers extending from the quarries of Rozerieulles to beyond the direction of Point-du-Jour appeared out of the smoke, closely followed by columns at fairly regular intervals. The French came forward at the double in excellent order, and as they came down the slope, the fire from the rear ceased, while bugle-calls, beating of drums, and shouts of "En avant" and "Courage" filled the air.

This counter-attack could be seen with the naked eye from the heights near Gravelotte; from there it appeared as if the French had reached the eastern edge of the wood, and, working through it, were continuing their attack on Gravelotte. To most of those standing on these heights it looked as if the guns south of St. Hubert had been captured. It was impossible to estimate the strength of the French counter-attack either at Malmaison or at Gravelotte. The general impression was that it was made by a division of fresh troops; this was, however, a false estimate. The German guns at Gravelotte caused a great thinning out of the French columns, but it was impossible to tell whether they had brought the French onslaught to a stand or not. While still in uncertainty over this matter, there suddenly appeared from out of the western edge of the wood a mob of panic-stricken men, belonging to various regiments, making for the high ground occupied by the German guns. For a moment or two it was impossible to distinguish whether the disorderly array of men coming towards them were friends or foes. These men, panic-stricken, all sense and moral entirely lost, might possibly be French attacking lines. But in a few seconds it was clear that the men coming towards them were German infantry. Absolutely and entirely under the influence of a deadly fear, neither words of command nor anything else could stop them. Several artillery Officers rode amongst them with drawn swords, they were told they would be shot down by their own guns. It was all useless. On such occasions men are past reasoning with. It being impossible to gather this "scum" from the fight, attempts were made to direct their retreat clear of the guns; that also was impossible. Driven by the panic which had mastered them, the fugitives made straight for their own guns, bolted through them; not even the voices of the German gunners could bring them to reason. The men were only halted when well in rear of the artillery, and Officers of all branches, from Generals to

Lieutenants, were engaged in halting them. The Royal Headquarters, as well as the Headquarters of the 1st Army, were greatly troubled at the occurrence, and every endeavour was made to prevent a defeat, culminating in a retreat, occurring on this portion of the battle-field.

As an instance of how the moral energy of the German firing line was spent when this attack occurred, it was sufficient for one man to shout "Columns!" "Columns!" to make a company, which was about 300 yards in front of the wood, bolt straight back to seek shelter inside it.

The French attack, as a matter of fact, never reached the wood. The troops who had made this attack had been fighting all day, and the destructive effect of the German shells, combined with the appearance of fresh infantry on their right flank, was sufficient to stop the French about 150 yards short of the woodland. The extent of the advance was distinctly marked by the line of corpses. From Gravelotte, however, it was impossible to tell this.

The German infantry, which had succeeded in turning the tide of French success, were four battalions belonging to the 32nd Brigade, which General von Goeben had sent forward towards St. Hubert at about 6 o'clock. The appearance of this column caused the French not only to halt in their attack, but to bolt back towards Point-du-Jour. The four battalions followed up their advantage, and from St. Hubert it appeared that the frontal attack against Point-du-Jour would finally meet with success. The advance was anxiously followed, but shortly before the bend of the road near 1076 was reached, a rain of bullets fell upon the battalions; they halted and wavered, and this attack, begun with so much hope, was wrecked. Throughout the many hours the fight had lasted, this was the first combined attack of several battalions on the enemy's position, the first great infantry attack on Point-du-Jour. Though the General Commanding the 16th Division had not succeeded in his attempt, he had at least succeeded in restoring the battle, and he might rest content with having done so much.

It has been said that one of the reasons the French made no attack from Leipsic was because Marshal Lebœuf had expended all his reserves. By this, however, we must not suppose that the whole of his corps had become absorbed in the firing line. Lebœuf had committed the great fault of letting all his four divisions out of his hands without having any troops in reserve for him to use as required. The General Officers Commanding Divisions, however, with the exception of Aymard, had all, comparatively speaking, strong reserves at their immediate disposal. It would always have been possible throughout the day for the Marshal to have collected sufficient troops together to have formed a division. The Germans owe to the faulty management by Marshal Lebœuf of his corps their immunity from any serious counter-attack on his part.

The panic south of the high road has been described; another occurred shortly after, on the road and its immediate vicinity.

The 9th Hussars had followed the four battalions of the 32nd

Brigade down the road and halted under cover of the high ground westward of St. Hubert. While in that position the remounts and additional drafts joined it from Trier. The Colonel, instead of sending them back to the rear at once, turned them into a 5th squadron, which formed up in rear of the 4th. This 5th squadron was a most undesirable addition to the regiment, for the horses would not stand fire, were nervous and excitable, and were not thoroughly trained. When the attack of the 32nd Brigade came to a standstill, the hostile fire increased in violence, and the hussars plainly saw their own infantry in retreat. The Colonel ordered his men to mount, intending to retire the regiment a few yards. The orders to retire, halt, and front were well executed by the original four squadrons. The 5th, misunderstanding both signals, at first retired at a trot. The horses, frightened by the bullets, went faster and faster, and eventually bolted. They clattered through Gravelotte, to the consternation and astonishment of the beholders, and charged the remnants of the infantry who were being slowly collected together after the rearward movement, which had been already mentioned. But the worst was still to come. On the right side of the road a large number of wagons and spare horses were halted, in excellent order, the left side being kept free for the movement of troops. The teams became restive at the approach of the hussars, could not be quieted; they tried to follow them; those that succeeded bolted, and all helped to increase the horrible confusion that reigned. It was in vain that Officers attempted to stop this mad flight of men and horses; they all of them forced their way to the rear. The confusion was indescribable. The Royal Headquarter Staff and the Commander of the 1st Army looked on sullenly at the disagreeable spectacle. The IInd Army Corps, which was approaching, in spite of all its enthusiasm, could not avoid being badly impressed by this sight. No one could see a reason for the panic. Blows with the sword and oaths were powerless to stop the maddened fugitives. It was only when the lungs of men and horses gave out that the wild stream stopped, and endeavours were made to collect them, naturally, well in rear of the IInd Army Corps. Several fugitives appeared in Vionville and the neighbourhood, exclaiming, "We are beaten, we are beaten." Several Officers lost their spare horses and never saw them again.

The remainder of the regiment remained till the end of the battle near St. Hubert; one squadron charged to cover the retirement of the infantry.

This is mentioned, as it would be unfair to judge of the hussars by the conduct of the 5th squadron. The panic above described is, when explained, easily understood; it also is not without its instruction for the future.

The orders given to the IInd Corps to attack Point-du-Jour with all their available forces would appear to have been given by the King himself, and they were given directly contrary to the desires expressed by Steinmetz, for, as already mentioned, when making his personal report to the King at 4.30 P.M., he had requested that the IInd Corps be employed against his enemy's right wing, a frontal

attack being hopeless. We find that two hours after Steinmetz had declared a certain action impossible, the King declared it was to be done. The question arises whether General von Steinmetz urged any reasons in favour of his opinion as to the inadvisability of a frontal attack. Captain Hoenig says he did not, and the reason is not difficult to seek. The meeting of the King and General von Steinmetz took place at too great a distance from their respective Staffs to enable anyone to hear what words were exchanged between the two. It was evident, however, from the excited gestures of the King and the serious expression on Steinmetz's face as he rode away, that the former had expressed his disapproval of the measures taken by the latter up to the hour of their meeting. From that moment General von Steinmetz's ill-temper increased, and he carefully avoided coming again in contact with the King, and simply acted strictly in accordance with any orders he received.

If, however, General von Steinmetz would not express his doubts about the advisability of the orders given to the IIInd Corps, it was done by no less a person than General von Moltke. After the order to attack Point-du-Jour had been issued to the IIInd Corps, and the preparations were sufficiently advanced to enable one to point out to the King that the direction adopted by the corps would be undesirable, all the consequences of the order appeared so clearly before General von Moltke that he expressed his great doubts, both as to the advisability of any further attack at that late hour of the day, and more especially of a frontal attack.

Even as early as 10.30 A.M., the orders were given to attack from Bois de Vaux, as well as from Gravelotte. Since his arrival at Malmaison, he had noticed how little had been done from the former direction, and that the enemy's left wing had not been pressed as he intended it should be. The objections to an attack made at dusk, without adequate preparations, were obvious, and the hopelessness of its succeeding without support from the direction of the Bois de Vaux was pointed out to the King. The latter, however, declined to cancel the orders he had previously given; the manner of executing the same was left to General von Steinmetz.

The wish to force the battle to a decisive issue before the day closed, after a struggle of many hours, is comprehensible, and the belief that the opponent was exhausted by his efforts was a fair one. The King's opinion should not therefore be criticized as unsound, but, to give effect to it, the best means should have been chosen. When we consider the stress laid in the morning on the flank attack being made from the Bois de Vaux, and the orders issued by the King for frontal attack without the combination of a flank one, we perceive a want of harmony between the two. In describing this important occurrence, the Field Marshal expresses himself as follows:—

“At about this hour (6 P.M.) the King and his Staff had ridden forward to the height south of Malmaison. But it was not possible to distinguish how matters had shaped themselves on the enemy's left wing, which was over 4 miles from the spot where the Staff stood. Along the entire front, from La Folie to Point-du-Jour, the hostile

artillery had very nearly died out, whilst from the north the report of heavier artillery fire was audible. The day was drawing to its close; it was necessary to force a decision. The King ordered the Ist Army to make a fresh advance, and he consequently placed the IInd Corps, which had just appeared after a long march, at General von Steinmetz's disposal.

"All the available battalions of the VIIth Corps were, *with the exception of five acting as a reserve*, therefore again sent across the Mance valley.

"The line was prolonged towards Point-du-Jour and the quarries by the battalions already formed up in the Bois de Vaux.

"The 2nd French Corps, which had to meet this attack, had just been reinforced by the Guard Division of the Voltigeurs. The whole of their reserves were brought into the firing line. The artillery redoubled its activity, and a destructive rifle fire was poured in against the advancing foe. Then the French proceeded themselves to the attack; their men, being in dense swarms of skirmishers, drove the smaller bodies of Germans, who were leaderless, and were lying down in the open field, back towards the edge of the wood. Here, however the French attack reached its limit, but the Germans had a fresh corps at their disposal.

"The IInd Corps, which was the last to be despatched by rail towards the theatre of war, had followed up the advance of the army by forced marches, without, however, having been able to partake in any of the previous combats. It had commenced its march at 2 A.M. from Pont-à-Mousson, and had arrived *viâ* Busières and Rézonville, to the southward of Gravelotte, in the evening. *The wish of the Pomeranians to come to conclusions with the enemy that self-same day was loudly expressed.*

"*It would have been better if the Chief of the Staff of the Army (himself) had not permitted this corps to advance at such a late hour. An intact body of men like these would have been most desirable for the following day. On the same evening, however, it was hardly to be expected that they would be able to cause the balance of victory to incline decisively towards the Germans.*

"It might have been desirable that the less exhausted IInd Corps should have been sent into the firing line, to hold and occupy it, while the various portions of the VIIth and VIIIth Corps, which were all mixed up together, were collected and re-formed in rear of them."

Captain Hoenig states that on reading the last words that appeared in italics, he had at first felt inclined to omit what he had already written on that point, but on receiving fresh information on the subject he came to the conclusion that his account was strictly in accordance with the facts. He tells us that several eye-witnesses informed him that when Moltke found that the King would not act on his advice, but that the desire of the former became an order, Moltke slowly turned away from the King, rode off about 100 yards to the right, and appeared to occupy himself with something else. He intended the idea to be conveyed that he did not agree with the orders issued. Those who witnessed the occurrence understood it in

that sense, and were greatly impressed thereby. Later on, as the IIInd Corps approached the western edge of the wood, Moltke followed it for a few paces along the high road, accompanied by a number of Officers of the General Staff, while the King remained near Malmaison with Bismarck, Roon, and Podbielski. The Headquarter Staff were not together again till after dark.

It is difficult to believe that a General like Moltke did not recognize on the spot that an order, which he afterwards condemned, was in itself a mistake. It seems so little probable that one asks what motive Moltke could have had in writing as he did, why he should take on himself the responsibility for an action which took place against his advice? The motive is to be found in the preface to his own history of the war. Moltke says, "What is published in a military history always fits in with the story of a successful action, but it is a duty one owes to the dead, to one's love of country, not to disturb any prestige which may accrue to any individuals, owing to any of our victories being attributed to them." From this, it would appear that Moltke deliberately took upon himself the responsibility for the order given to the IIInd Corps to attack that night, in order to put an end to any discussion on the subject, and to shelter his King from any adverse criticism.

The orders given to General von Steinmetz were, that he was to set "all his available troops in action against the heights of Point-du-Jour," the details being left to him.

At 6.45 Steinmetz ordered Von Zastrow to lead all the battalions of the VIIth Corps still this side of the wood over the Mance valley. Whether they were to be led from the west against the front, or from the south-west against the flank, is not known.

The Commander of the IIInd Corps was ordered to attack Point-du-Jour in front, and, with the assistance of the troops of the VIIth Corps on his right, capture the hostile position under all circumstances.

On reference to the extract from Moltke's history, it will be seen that Von Zastrow did not carry out his orders. He wanted no reserves at that hour. The IIInd Corps formed the reserve for the army.

General von Fransecky did not expect any satisfactory results from the orders he had received; he knew Steinmetz too well, however, to care to make any representations to him on the matter. He decided to deal with matters as they stood. He knew that from where he stood brigades had repeatedly entered the wood, only to emerge on the other side as companies, and that every one of the attacks made in that manner had failed. He ordered the infantry, keeping well closed up, and maintaining all their tactical units, to follow the high road. The head of the column, after passing the eastern edge of the wood, was immediately to wheel to the south, gain ground towards Point-du-Jour, and then await the deployment of the rear of the column, in order that the enemy might be crushed by the rush of a compact body of men. In this manner, thanks to their superior discipline, the Germans hoped to make a successful night attack. The 3rd Division could not possibly deploy and be ready for attack before 8 P.M. The cavalry was to remain at Gravelotte.

Only two and a half batteries prolonged the line of German guns to the south; the remainder had to halt west and south of Gravelotte.

Though the IIInd Corps was, compared with the VIIth and VIIIth Corps, a fresh body of troops, owing to the hour at which this final attack was made, this advantage was nearly balanced by the fact that the German artillery was compelled to cease its fire, for from their position it was impossible to distinguish their own troops from the enemy's. The attack by the Germans was necessarily purely an infantry attack, unsupported by any artillery; the French, however, were able, for the first time, to bring their guns into action and direct them against the attacking infantry without fear of being crushed.

The 3rd Division marched down into the defile with bands playing and colours flying. Unfortunately, the music had not the inspiring effect it was intended it should have. It has already been stated that the men near St. Hubert formed a reservoir which fed the stream which was continually flowing westward. A large number of these men were collected at the bottom of the ravine. Their reasoning powers had left them for the time, and, on hearing the sound of the music—unable to distinguish whether it came from friend or foe—they rose from their concealment and bolted for the rear. This naturally created a certain amount of confusion, but the advancing troops were not particularly disorganized by the event. When, however, the troops in and near St. Hubert were fired at from the rear, the slight bonds that kept them together were snapped, and a flood of fugitives burst on to the 54th, the leading regiment. The shock was so violent, that the fugitives broke through it and swamped it; the regiment consequently got out of the direction it was ordered to move in. As other troops were advancing close alongside the 54th, the fugitives charged them also; and it was with the greatest difficulty that order was kept. Thus we see that, in the dark, there were two opposing streams, one rushing in disorder from front to rear, the other moving forward towards it. Matters remained like this for some hours, until the IIInd Corps was formed up in close order near the enemy's position. Under the circumstances, all idea of a night attack had to be abandoned. Any combined movement by the IIInd Corps had been nipped in the bud by this fresh panic, the worst and longest one of the day. The Generals had to be satisfied if they could manage to dam the disorderly stream of fugitives, and, instead of a deep wall of men, in column extending from front to rear, establish a thin line along the entire front opposite Point-du-Jour.

Thanks to a good state of discipline, this difficult task was successfully accomplished. It was of course impossible to think of continuing the fight; every condition to bring it to a successful issue was wanting. It is impossible to give a more detailed account of this panic and of its effect in rear of the fighting troops, for darkness had concealed everything. It is a blessing that the French forces were spent, for at this period, a fresh brigade, boldly led, would have obtained, locally, a decisive victory, for, at that time, the greater

portion of the 3rd German Division was, comparatively speaking, defenceless. It was wedged in near the wood and on the road, the fugitives from the front pressed against it from one direction, and the remaining forces in rear pressed on it from the other; this, combined with the woody nature of the country and the darkness, rendered it impossible for the division to deploy for a considerable time. This was the most critical moment of the day, but luck favoured the Germans, and no disaster occurred.

The modern battle is wonderfully destructive of the moral of the soldier. It can be reduced to a low ebb by the mere effect of remaining for a considerable time under hostile fire, as well as by an unsuccessful attack, the only difference being that the effect is more quickly felt in the latter than in the former case. The effect of a long exposure to hostile fire is even, possibly, the more destructive to the moral of the two. A panic and a flight are usually the consequences of the sudden appearance of something unexpected. Troops which are not even threatened get seized with it. It is perfectly comprehensible that, after a long strain, the moral power of the best suffers; but in spite of this, one rule must never be relaxed—attention must be paid to the enemy, and his movements watched. Even when troops are lying as close to the ground as possible, unable to advance, some Officer must watch at every important point, and should he be placed out of action, he must be replaced by another. It is only by these means that false reports, false impressions, &c., can be dealt with in time to prevent their effect being harmful.

The number of men who streamed away to the rear was very large. The firing line became thinner and weaker, and the Generals eventually discovered that there were only a few hundred rifles when they thought they had brigades engaged with the enemy.

At about 7 P.M. an event occurred which, for some extraordinary reason, is not mentioned at all in the official account of the battle, although it was the most important tactical success that was gained on this portion of the field during the day. This was the capture of the quarries of Rozerieulles. Their capture paved the way to an eventful victory before the 3rd Division had been engaged. It must be observed, however, that Brigade Commanders and Officers junior to that rank received either insufficient orders, or none at all; they received no objective for the attack; their orders were simply to "attack." In the case of a frontal attack, such an order may be permissible, for under those circumstances it is often impossible to specify particularly what the objective is to be. But in the case of a flank attack the circumstances are different, and an objective should be definitely selected. About the time St. Hubert was captured, it will be remembered that the 33rd rushed from the gravel pits to capture the quarries. The official account only mentions the account casually, and, in addition, puts a false complexion on the facts, for it states that the 33rd were driven back by the overpowering fire of the French (p. 89), and, consequently, the quarries could not have been captured.

The quarries of Rozerieulles form the natural objective for a frontal

attack as well as for an attack from the right towards Châtel St. Germain. The distance from the edge of the wood to their south-west corner is about 350 yards. Their length is about 700 yards, their extreme width 440.

The south-west corner of the quarries was open, but the main portion, lying between the main road and the road running to the gravel pits, did not convey the impression of being so. This was because it was divided into five subdivisions, by four walls cutting across it, so that coming from the westward one could only see as far as the next wall. The distance between the walls averaged from 90 to 130 yards. This series of walls was a disadvantage to the French, for they could not regularly occupy each of them, while to the Germans they were a distinct advantage, for as each portion was captured they could shelter themselves under cover of them.

The French, after having retaken the quarries at about 4 P.M., did not remain there, but retired back to the high road. Of this fact, however, the Germans were ignorant, and at about 7 o'clock portions of the 33rd, 39th, and 40th, under the command of a Captain, stormed the south-western portion of the quarries. They doubled from the wood, where they had been formed, to the quarries; on reaching them the whole party were utterly out of breath, and were, for a few moments, incapable of any action whatever. When they had recovered their breath, they pushed on through the quarries till they reached the most easterly wall. This wall had barely been occupied when a closed body of French infantry were seen on the high road, marching towards Metz. When they arrived opposite the Germans, they were fired at, at 150 yards elevation. The column was evidently surprised, and unaware that the Germans had penetrated into the quarries. A second column attacked the German left wing, advanced to within about 70 yards, fired nine volleys, and then retired to continue their march. As they did so, they suffered severely from the fire of the Germans. A third body of troops acted in the same manner, and met with the same fate. A fourth then made a frontal attack, with a deal of resolution and in close formation, but this was repulsed, and a pause ensued in the fight. It was then noticed that the only places where the Germans, who were lying down, were wounded, were in the legs and feet, from which fact we may deduce that separating the legs when lying down is not always advantageous. Shortly afterwards this body of men were reinforced by about two more companies, and firing having completely ceased at about 9.15 P.M., the Germans evacuated the quarries at about 10 P.M.

Had this success, obtained by a handful of men, been followed up as it should have been, the defeat on the French left would have been as decisive as their defeat near St. Privat.

Owing to the distance of the quarries of Roserieulles from the positions occupied by General von Steinmetz and General von Zastrow, any report that the quarries were in German occupation at 7 P.M. would have reached them too late. It is not the business, however, of Officers in the firing line to send back reports; no blame can, therefore, be attached to them for not sending any. General von

Zastrow should have taken steps to ensure that reports reached him of every important occurrence from the Mance Mill and the Roserieulles quarries. If a lancer regiment was able to remain formed up for a considerable period east of the wood, what difficulty was there in posting Staff Officers and Adjutants near the east edge of the wood as well, so as to see and report on what was occurring? That is where they should have been during the action, not west of the wood near Gravelotte. The simplest rules were not followed; there was no indication of any plan having been formed; the troops in front never knew what was intended of them; the Generals in command did not know where their troops were or what troops belonged to them. There was no connection between the men in the firing line and the Generals in rear, and both the men and the Generals were fumbling about in the dark. And yet at peace manoeuvres the number of reports that come in about matters of no importance is marvellous. Had this connection from front to rear been maintained, General von Steinmetz would have known at 3 o'clock that the quarries were captured, but both he and General von Zastrow were as ignorant of the first capture as they were of the second. Even with the leadership that existed, had information of the first capture been received, sufficiently powerful reinforcements would have reached the quarries in time to give a decisive turn to the fight. Perhaps the reason for suppressing in the official account the whole of this most heroic deed on the part of the men was that it was feared that thoughtful men with the above facts before them would have formed their own opinions about the stamp of leaders the Germans had. The troops did all in their power to show from which direction the victory would be decided, but their leaders appreciated it no better than they understood Moltke's orders for battle. The attack made by the IInd and VIIth Corps at 7 P.M. was made in complete ignorance of the true condition of affairs that the capture of the quarries had brought victory within their grasp.

While the battle was raging with all its vehemence in front, a terrible scene was being enacted in another portion of the field. The French who had been severely wounded in the action of the 16th August had been brought to the various farmhouses in the neighbourhood, such as Malmaison and Mogador. When the Royal Headquarter Staff took up their stand between these two named places, the target they presented was too tempting for the French artillery to resist. Mogador, though the Geneva flag did not float above it, was to all intents and purposes a hospital, and was full of wounded. The unfortunate victims of the 16th, owing either to a lack of organization or to some forgetfulness on the part of the French, had been abandoned when the army retired to the Leipsic—Point-du-Jour position. The wounded had no means of communicating with the outer world, and the Germans were in entire ignorance of the existence of any wounded in the building. Eventually the French shells set fire to it. There is nothing extraordinary in a burning building; during a battle one is occupied with matters of more pressing importance, and the building is generally left to burn itself out. The wounded

were burnt to death, and it was only the next day that the Germans were aware that Mogador had been turned into a temporary hospital.

Captain Hoenig's works on Gravelotte only deal with the action of the German right, but for purposes of comparison we are given a general idea of the manner in which Prince Frederick Charles acted as an army Commander. As soon as he heard the sound of the guns, at about 10 A.M., he directed his steps towards them. At 1 P.M. he was between St. Marcel and Verneville, at 2 P.M. at Habonville, and there he remained near the decisive point till the close of the battle. Napoleon could not have acted better, and Prince Frederick Charles by his action during the battle, ably seconded by the Commander of the XIIth Corps, succeeded in minimizing the consequences of the strategical errors committed on the previous day. Both the Royal Princes fully grasped the strategical situation; they both attempted to reach the last line of retreat of the French, the valley of the Moselle, and they succeeded in doing so. Napoleon, who has been unapproached, committed errors. The true General is the man who understands how to put matters right after a mistake has been committed, and before the full effects of the error have been able to make themselves felt. Though we may find ourselves compelled to criticize unfavourably the extreme caution and want of enterprise shown before the battle, we must in justice state that as soon as the Commander of the IInd Army received the report giving the position of the French left, he showed himself fully capable of dealing with the situation; his method of conducting the battle need fear no hostile criticism.

The remarks made by Captain Hoenig on the choice of positions selected by the Royal Headquarters Staff have already been given, and need not be reproduced.

General von Moltke had watched the last conflict of the day from the slopes of Point-du-Jour, and at about 10.30 P.M. he rode back with the Headquarters towards Rézonville. The impression which the fighting of the Ist Army had left on him was not favourable, and it was with reluctance that the General left the scene of action. He was, however, fully resolved that after the VIIth and VIIIth Corps had been rallied in rear of the IInd the battle should be renewed and brought to a decisive issue early the following day. Though many things must have occurred which were displeasing to the General, he at least knew from his own observation the position of affairs with the Ist Army, and that during the night nothing could occur to alter it. With the IInd Army matters were different. St. Privat had fallen at about the same hour that the IInd Corps deployed for attack, and shortly afterwards the French evacuated Amanvillers. Prince Frederick Charles had taken steps to destroy the communications in the valley of the Moselle, thereby fully acting up to the spirit of Moltke's intentions. The Prince had witnessed the battle and remained near the scene till the fight had completely died away, and at 8.30 P.M. had issued suitable orders in case anything occurred during the night. Owing to the great distance between St. Privat and

Gravelotte, the Prince's report did not reach Moltke on the battlefield, but only at Rézonville during the night. On the other hand, the Prince had received no further instructions from Moltke, and had fought the battle entirely independently. Splendidly supported by the Commander of the XIIth Corps, the glory of the victory of St. Privat must be awarded rather to Prince Frederick Charles than to Moltke. For though the orders of 10.30 prescribed the enveloping movement, they were issued on false premises, and the Prince knew how to fulfil Moltke's desires without any further assistance on finding that the actual conditions were different to the pre-supposed ones. His circumspection and calmness are as attractive as the clumsiness and misdirected energy of the Commander of the Ist Army are the reverse.

We know that at 5 A.M. on the 19th August the Commander of the IIInd Army made arrangements to shut the French completely up in Metz and cut off all their communication with the exterior world. We see how thoroughly Moltke's idea of envelopment was grasped. The credit of forming this idea belongs to Moltke, and to Moltke alone; the credit for executing it is solely Prince Frederick Charles's. The victory at St. Privat led to the evacuation of Point-du-Jour. The 18th August, 1870, was the most eventful day in the life of the Prince. His victory released General von Steinmetz from a painful situation. This, however, only increased the feeling of irritability the latter had towards the former. In addition to the serious consideration of the relations between Moltke and Steinmetz, the relations between the latter and the Prince had to be considered. The result was that Steinmetz ceased to command the Ist Army. Steinmetz compiled a memoir relating to these conflicts which he desired should be published after the Emperor had perused it. The Emperor, however, was of opinion that such a publication would be inadvisable, and the General was too good a soldier not to look upon such an expression of opinion otherwise than in the light of an order. This is all the more creditable to Steinmetz, as the official account of the battle in many places heaps blame upon him where he was not to blame. The reader is referred to pages 16, 71, 103, 111 in the English translation of the official account.

The battle of Gravelotte-St. Privat was a strategical battle, and was practically won when the German Army had completed their wheel to the right. In spite of many slips, the movement succeeded, and Moltke was then in a position to choose his favourite form of attack, a frontal one, combined with an envelopment of one or both of the opponent's flanks. In this case he chose the latter, and though his intentions were not fully carried out, the action of the IIInd Army was sufficient to ensure a brilliant strategical victory.

The tactics adopted by the Ist Army were, as has been shown, most indifferent. The troops slipped out of the hands of their natural leaders. It will be noticed that out of the 57 battalions which were engaged near Gravelotte, only four (the 72nd and one battalion of the 40th) battalions made a combined attack. On every other occasion we find that brigades, regiments, and battalions lost

all cohesion. The brave attempts made by separate companies to attack the French position were invariably beaten back.

The Germans, as they attempted to deploy from the road, were very much in the position of rabbits who are being bolted; they were shot down by the French with the greatest ease. The artillery of the VIIIth Corps was well handled, and the handling of the infantry of this corps compared favourably with the handling of the infantry of the VIIth and IInd Corps. Though it is often impossible to preserve any distinct lines of demarcation for the action of separate corps, yet there was no reason for the 39th, belonging to the 27th Brigade, being mixed up with the 29th Brigade.

The reserve brigade, the 31st, was sent into action at the right moment. Its action was not as successful as Von Goeben had hoped it would be; that, however, was the fault of Steinmetz and Zastrow, who sent the cavalry and artillery in the same direction at the same time. All the other troops combined did not obtain a greater measure of success than the 15th Division. Though the reinforcement of that division by brigades is unusual, yet, under the circumstances of the case, it was difficult to avoid doing so. It was a mistake sending the 9th Hussars over the Mance Valley; the arrival of the fresh horses at that identical moment was a real piece of ill luck.

The crowding at and near St. Hubert, which took place from 5 P.M., was most faulty. The farm was not occupied in a sensible manner, and nowhere did the infantry establish themselves in a proper fire position. It was this latter error which led to all the subsequent reverses; nothing was done to rectify it, or even to minimize it; hence the Germans never obtained superiority of rifle fire over their opponents. It must have been known that no attack could hope to succeed until this superiority had been established, and yet company after company was sent forward, all of them with equal want of success. The losses incurred by the French 2nd Corps, which amounted to 62 Officers and 2,043 men killed and wounded, is a conclusive proof that this fire superiority never was established.

The sole reason for the repeated successes obtained by the French in their counter-attacks was that the Germans had not established themselves in any fire position; otherwise their infantry would not so repeatedly have been knocked out of time. These successful counter-attacks also teach us how small the defensive power of skirmishers becomes, when they consist only of the remnants of men who have been repulsed, and who have become played out by repeated and continued disconnected attacks. The moment that Steinmetz and Zastrow actively intervened in the course of the action, mistake followed mistake. Neither of them understood Moltke's orders, and both of them refrained from making any preparations for an attack from the only direction from which a decisive result was to be expected, namely, from the Bois de Vaux. Never before has the infantry of a corps been so scattered and broken up as that of the VIIIth Corps. After the IInd Corps had been placed at Steinmetz's disposal, the errors he committed were inconceivable. The orders he

issued for the attack form a strong contrast to the orders for pursuit issued a few hours previously. The consequences of the order were, that in a space of a square kilometre, 48 battalions were placed in the dark in front of the enemy's rifles, and without the support of their own guns. They had not established themselves in any fire position. In spite of all this, the hostile position might have been captured at that hour; nay, it should have been captured. If the high opinion people have of the German discipline is justified, why did not twenty-four fresh battalions attack energetically for a matter of three minutes, instead of remaining for eight hours, till the next morning, before the muzzles of the French rifles? The answer is simple. There was no energy left in them; and yet histories and other books prate of their heroic deeds, and of their go!

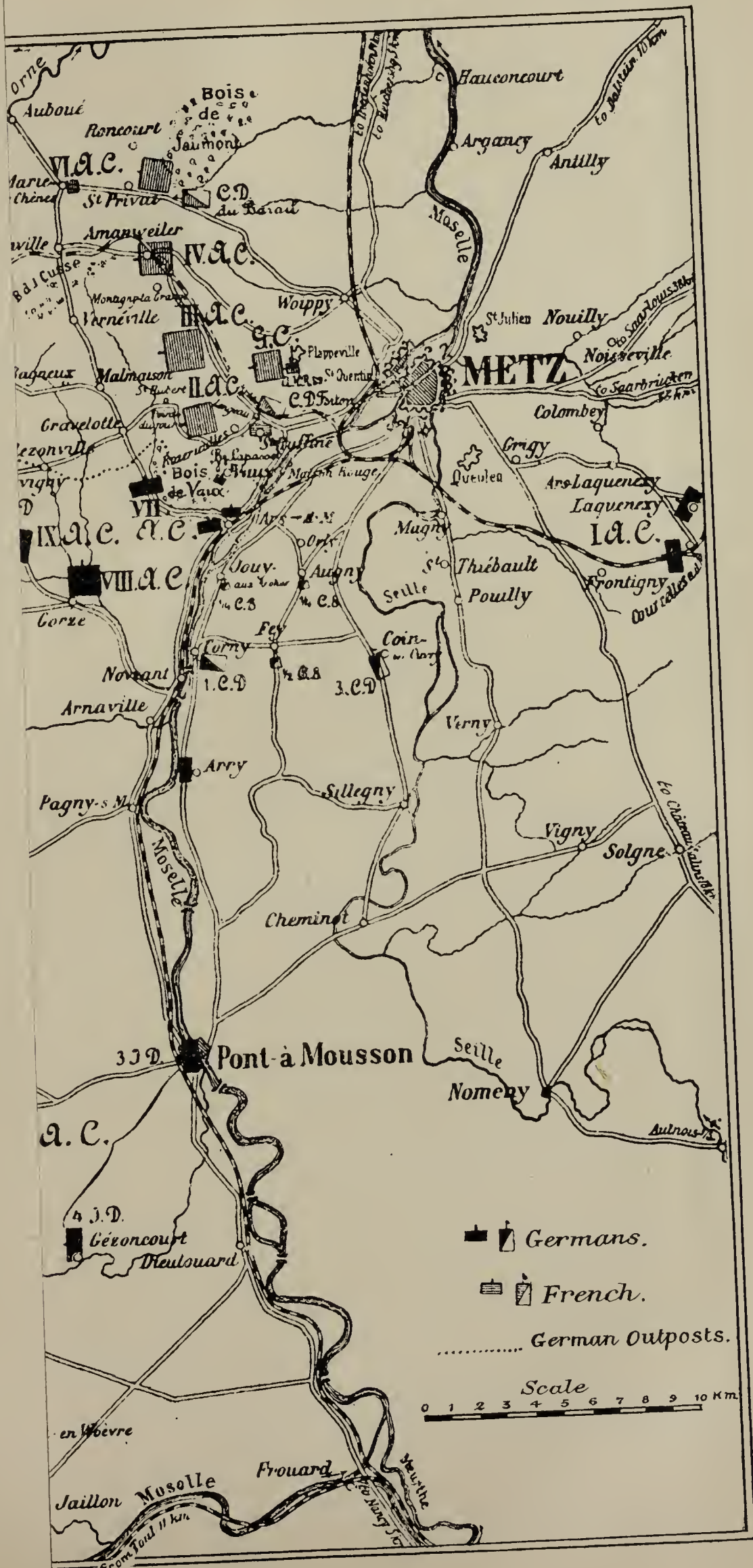
Both the artillery and infantry contributed to the capture of St. Hubert; it is due solely to the artillery that the Germans kept possession of the farm, for they never gave the French guns the opportunity of shelling the place. Had they been able to do so, the remnants of the 59th company gathered together at that spot would have scattered in all directions.

It will be noticed that the losses were severest among the infantry whose attacks failed. The losses of the four battalions of the 32nd Brigade, who made the only combined attack of the whole day, were, on the contrary, unimportant. The whole brigade only lost 7 Officers and 104 men. Under these circumstances one cannot exactly see that they had any sufficient reason to retire as they did. In the VIIth Corps the only regiments which suffered considerably were the 39th and 73rd. It is sufficient to consult the appendix in the official account to see that the action of the infantry of the VIIth Corps is hardly deserving of notice.

Moltke's greatest feat was the successful issue of the operations round Metz, which culminated in the battle of the 18th. The losses, which at Sedan were considerably less, the capitulation following immediately after the fight, together with the political consequences of the day, have all combined to lead even experts astray. A hundred intelligent laymen will mention Sedan for one who will mention Gravelotte-St. Privat. Moltke, however, thought differently. The imprisonment of Bazaine's army in Metz was the turning point of the whole war, everything else that occurred was but a sequel to the same.

The balance of military and political power lay with Bazaine's army. Once it was disposed of the war was as good as won; it only became a question of time. The German nation has, owing to the streams of blood which flowed before Metz, never thoroughly known what occurred at these several battles. Mars-la-Tour and Gravelotte are not popular names in Germany, and will not become so, the sacrifice at which the victories were won being too great.

Up to the 18th August the great Moltke had to contend with totally different difficulties than those with which he had to contend between the 23rd August and the 2nd September. Previous to Sedan, as previous to Gravelotte, both armies quitted their line of





advance, wheeled to the north, and were eventually thrown in an easterly direction against their opponent. All the circumstances were more favourable during the second series of operations than during the first. Above all, during the operations which led to Sedan, Moltke was working with two Generals who understood him, and who endeavoured to anticipate his wishes, while previous to the 18th, one General had constantly to be kept in check, and the other had sometimes to be urged on. The latter richly atoned for any error he may have committed by his conduct on the 18th; the former must, owing to his conduct at Gravelotte, be removed from the list of great Generals. Moltke's greatest deed is the Gravelotte-St. Privat campaign.

We have endeavoured to place before our readers Captain Hoenig's views on the battle under review. No mere epitome can, however, do them full justice; it is necessary to study his book. It may occur to those who read it that Captain Hoenig at times exaggerates, or uses needlessly strong expressions, and also that he constantly repeats himself. We should, however, remember that an advocate is always privileged to use stronger expressions than a judge, and even to remind the jury at times of facts which he fears may possibly have escaped their notice. Such is Captain Hoenig's position; the judge and jury are the military public for whom he publishes his works, and he may rest assured that their verdict will not be unfavourable to the views he advocates.

A SHORT ACCOUNT OF THE FRENCH MARINE INFANTRY.

Compiled by Captain H. D. DRAKE, R.M.A., D.A.A.G., from "L'Infanterie de Marine," by M. G. DE SINGLY, Assistant Secretary in the Department of the Navy.

Historical Résumé.

IN the year 1669 the Naval Department was formed, and on 20th December of that year a Decree was passed sanctioning the formation of two regiments of infantry for service exclusively at the military ports and on board ship. In 1671 these two regiments passed under the control of the War Department. In 1685, however, the Minister of Marine re-established an infantry corps designed specially for service in the Colonies, on board ship, and at the military ports. Various designations were assigned to this corps, as has been the case in our own Marine Service,¹ and in the course of two centuries, these troops were on six different occasions transferred to the War Department. But superior authority did not hesitate to place them again under the Naval Department, under which they have remained since 1831. In the year 1838 it received the name of Marine Infantry, and since this time it has developed in proportion to the extension of the French Colonial Empire. The annexation or extension of the Colonies of Tahiti, Cochin China, New Caledonia, Senegal, &c., the occupation of Tonkin, Annam, Cambodia, and of Madagascar, are the principal causes which have conduced to the augmentation of the Marine Infantry, and to the formation of the various Colonial corps hereafter described, the permanent staffs of which are furnished by the marine forces. The Marine Infantry consists of 17 regiments, 4 battalions, and 13 detachments, comprising a total of 181 companies of marines, and 76 companies of special and native troops. From 1838 to the present time there have been very few years during some part of which the Marine Infantry have not been called upon to take part in expeditions or wars. In the Franco-German War of 1870-71 the Marine Infantry formed a portion of the XIIth Army Corps, and the heroic defence of Bazeilles, in which they took a conspicuous part, will be remembered by all students of military history. At the present time the Senegal Rifles, under the command of Colonel Dodds, are doing good service at Dahomey, and in the recent operations in Tonkin, Annam, Formosa, Madagascar, and Upper Senegal, they have well upheld the traditions of the corps.

¹ Free naval companies, 1690; Royal Marine Corps, 1772; regiments for service in the American Colonies, 1772; Royal Corps of Marine Infantry, 1774-1822; naval regiments, 1831.

GENERAL ORGANIZATION.

Duties and Composition of the Marine Infantry.

Rôle of the Marine Infantry.—To the Marine Infantry is assigned garrison duty in the military ports, Colonies, and Protectorates (Algeria and Tunis excepted). It takes part in European Wars, and in maritime or other expeditions, and may be called upon to form detachments on board ship.

Composition.—The corps is composed of—

1. A general staff.
2. The personnel of the Marine Infantry.
3. The permanent staffs of infantry troops special to the maritime army.

General Staff.—The general staff of the arm comprises :

- a. Three Lieutenant-Generals and five Major-Generals ; Officers of every rank are attached to the Staff, and are seconded in their respective units, while temporarily occupying positions the pay of which is provided for by the Estimates.
- b. The Commander-in-Chief of the troops in Indo-China.
- c. The Military Commandant, and Majors of the troops in the Colonies.
- d. The Officers attached to the Ministry of Marine.
- e. The Officers attached to the Staff of Generals of marine troops.
- f. The Officers employed in Senegal.
- g. Officers attached to Governors.
- h. Officers employed on Courts-Martial in penitentiary Colonies (Guiana and New Caledonia).

The Marine Infantry comprises—

1. *In France.*

Eight regiments, two each at Cherbourg, Brest, Rochefort, and Toulon.

2. *In Colonies.*

Four regiments, of which three are in Indo-China and one in New Caledonia.

Four battalions, one in Senegal, one at Réunion, one at Diego-Suarez (otherwise British Sound, N. Madagascar), one in Martinique ; two companies in Guiana, one each at Guadaloupe and Tahiti, and detachments at Obock (near Perim, on the African mainland) and Tananarivo.

Permanent Staffs of Special and Native Corps.

The Marine Infantry comprises, besides its regimental cadres, the number of Officers, sergeants, corporals, privates, and buglers neces-

sary to hold the appointments and provide the reliefs of the permanent staffs of the corps enumerated below :

1. The regiment of Senegal Rifles..	12 companies.
2. The regiment of Annam Rifles..	12 „
3. Three regiments Tonkin Rifles..	48 „
4. Sepoy Corps	1 company.
5. Gaboon Rifles	1 „
6. Sakalave Rifles	1 „
7. Disciplinary Company	1 „
8. Colonial Disciplinary Corps	2 companies and 1 section.
9. Depôt of the Disciplinary Corps at Oleron.	

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The provisions of the laws, decrees, and instructions relative to the Army are applicable to soldiers of all ranks of the Marine Infantry according to the decision of the Minister of Marine.

General Staff. Duties of Inspectors-General. Technical Committee.

Inspector-General.—The senior Lieutenant-General of the first section of the General Staff of the Marine Infantry is the Inspector-General of the arm.

The other Lieutenant-Generals and Major-Generals are employed either as Assistant Inspectors-General, or according to the requirements of the military service of the Naval Department in France and in the Colonies.

In 1890 the composition of the first section of the General Staff of the Marine Infantry was as follows :—

Lieutenant-Generals, 3 : 1 Inspector-General, 2 Assistant Inspectors-General.

Major-Generals, 5 : 1 Commanding-in-Chief the troops in Indo-China, 1 Commanding the 1st Brigade in Indo-China, 3 Assistant Inspectors-General.

Duties of the Inspectors-General.—The Inspector-General and the Assistant Inspectors-General in France assemble, after the inspections, to draw up—

1. A list of each rank in order of merit of all Officers selected for promotion by the competent authorities.

2. A list for each corps, in order of merit, of all Officers, non-commissioned officers, and soldiers selected for admission to, or advancement in, the order of the Legion of Honour, and for the military medal.

This list is also drawn up in order of merit for the whole arm.

3. The general list of Officers nominated for special employment ; in case of an equality of votes in determining the order of preference the President has a casting vote. The general list of Officers proposed for promotion, as well as the lists rendered by each In-

spector-General, are forwarded to the Minister for the purpose of being submitted to the Board of Admiralty in due course. The Inspector-General and the General Officers of the Marine Infantry employed at Paris are summoned to assist in the work of the Board of Admiralty in framing the promotion tables of the Marine Infantry.

The other duties of the Inspector-General of the Marine Infantry and of the Assistant Inspectors-General are determined by the Minister of Marine.

They are regulated by a Ministerial Decree of 9th July, 1874, in the following manner:—

The Inspector-General and Assistant Inspectors-General have no direct command over the personnel of their arm, except that which is delegated to them by the Minister while they are exercising their functions, and at the time of their actual presence in the localities where the troops they are inspecting are stationed. Beyond these functions the Inspector-General is authorized to correspond with Officers commanding regiments in France and in the Colonies through Maritime Prefects and Colonial Governors, in order that he may keep himself informed of the different details which affect the Marine Service. He receives to this end, through the Minister, periodical states on which are set forth anything which has happened since the last state was rendered, and all that concerns the Service, the police, and the discipline of the troops.

The Inspector-General in his correspondence can in no case convey any order to Commanders of regiments or detachments, either directly or through the local authorities; when several detachments are formed into a regiment, the Inspector-General corresponds with the Officer commanding the whole. The Inspector-General may suggest to the Minister anything having for its object the introduction of improvements into the Service generally, and may request that any laws, decrees, and instructions governing the land forces may be applied to all ranks of the Marine Infantry.

The Inspector-General is consulted by the Directors of the Central Administration—

1. On questions of organization, administration, and accounts, not provided for by the regulations.
2. On changes and improvements to be introduced into the equipment and arming of the troops.
3. On modifications to be introduced into existing regulations when they concern the special organization of the Marine Infantry.
4. On exchanges between Officers of the arm with those of the infantry of the Line.
5. On requests for exchanges, for personal convenience, between Officers of the Marine Infantry whenever the Minister does not exercise the special rights conferred upon him.
6. On requests by Officers for permission to marry.

The Assistant Inspectors-General represent the Inspector-General when absent or when prevented by any cause from attending. The Minister may consult them separately on all questions concerning which he desires to know their personal opinion.

At the commencement of each year, having conferred with the Assistant Inspectors-General on returning from their tour of inspection, and having received the combined reports of the Inspectors-General in the Colonies, the Inspector-General forwards to the Minister a general report on the whole arm.

Annual Inspections.—These are carried out yearly by General Officers of the arm in France, and in the Colonies and Protectorates.

In detachments beyond the seas, where these duties are not performed by Generals of the arm, they may be performed by other military Officers by special authority of the Minister of Marine.

Technical Committee.—This is assembled in Paris, and is formed of the Inspectors-General and Assistant Inspectors-General of the Marine Artillery and Infantry. The Committee is consultative. It is assembled by superior authority, or may take the initiative itself for the consideration of the following questions:—

- a.¹ Preparation for the mobilization of regiments or portions of regiments of Marine Infantry in France or in the Colonies.
- b.¹ Preparation of plans of mobilization of military ports.
- c. Effect to be given to the reports of Vice-Admirals Commanding-in-Chief, Maritime Prefects, and Inspectors-General on that which concerns the instruction of the troops.
- d. The application to the marine forces of regulations relating to instruction which are in force in the War Department.
- e. Improvements to be introduced into the organization of the troops in France and in the Colonies.

The proposals of the Technical Committee are transmitted to the Rear-Admiral whose duty it is to lay them before the Minister, and take his instructions concerning them.

A Colonel or Lieutenant-Colonel of Marine Infantry performs the duty of Secretary of the Technical Committee, and has a voice in its deliberations.

In case of necessity he is replaced by the Orderly Officer of the President of the Committee.

An Officer of Marine Infantry of the rank of Captain is detached to Paris to serve as assistant to the Secretary of the Committee.

General Officers.—Lieutenant-Generals and Major-Generals are divided into two sections, of which the first comprises those serving and awaiting employment; the second forms the reserve. In peacetime active employment is given exclusively to the General Officers forming the first section. In time of war the General Officers of the second section may be called upon in case of necessity. General Officers who, on account of ill health duly certified, are incapable of continuing in active service may be relegated to the second section in anticipation, either by Décret of the President of the Republic or at their own request. These Officers may be recalled to active service when the causes which actuated their removal to the second section have ceased to exist. The time passed by these Officers in the second

¹ The General Staff of the Minister is, however, charged with the centralization of these questions.

section is reckoned as service for half-pay and retirement only. Whatever may be the Colonial duties performed by General Officers of Marine Infantry, their place on the foreign service roster is determined according to the date of their last return to France, either in their present rank or in the rank of Colonel.

Lieutenant-Generals at the age of sixty-five, and Major-Generals at the age of sixty-two, cease to belong to the first section and pass to the second. By virtue of a Decree of the President of the Republic, General Officers may be retained in the first section, irrespective of the age limit, and may be employed in time of peace up to seventy years of age if they have rendered distinguished services before the enemy in fulfilling with credit one of the following functions:—

1. Commanding-in-Chief an army composed of several army corps.

2. Commanding-in-Chief an army corps composed of several divisions of different arms.

3. Major-General Commanding-in-Chief the artillery or the engineers of an army composed of several army corps.

Lieutenant-Generals included in the above-mentioned categories who are provided with employment in time of peace will form part of the first section of the General Staff; those unemployed will be placed on the supernumerary list.

Organization of the Troops in France and in the Colonies.

A battalion consists of four companies. The 1st, 2nd, 3rd, 5th, and 6th Regiments consist of three and a half battalions, the 4th Regiment consists of four and a half battalions, the 7th Regiment of three, and the 8th regiment of four battalions. The last company of the last battalion of each of the eight regiments is permanently utilized as the company of instruction. The “*Dépôt des Isolés*” is attached to the 4th Regiment at Toulon.

All companies of Marine Infantry stationed in France have a fixed establishment of 3 Officers and 100 non-commissioned officers and men, viz. :—

1 Captain
1 Lieutenant
1 Sub-Lieutenant

3 Officers.

1 sergeant-major
1 senior sergeant
5 sergeants
1 quartermaster-sergeant
10 corporals
2 buglers
80 privates

100 non-commissioned officers and men.

Companies serving in the Colonies are composed each of 3 Officers and 150 non-commissioned officers and men, viz. :—

1 Captain
1 Lieutenant
1 Sub-Lieutenant

3 Officers.

1 sergeant-major
1 senior sergeant
7 sergeants
1 quartermaster-sergeant
1 quartermaster-corporal
12 corporals
3 buglers
124 privates

150 non-commissioned officers and men.

Paris Battalions.—The 1st, 2nd, 3rd, and 5th Regiments furnish each two companies from their 1st battalions, which form two separate battalions detached to Paris. The companies number 3 Officers and 125 non-commissioned officers and men each. These two battalions are under the Military Governor of Paris for all matters of discipline, interior economy, &c.

Posting of Officers.—The Minister posts the Officers to the different units. Nevertheless, the Maritime Prefects, on the suggestion of the Commanding Officers, and subject to the approval of the Minister, nominate the Captains and subordinate Officers of the two regiments stationed in each port. The Company Commanders of the three 1st battalions of each regiment are chosen as much as possible from among the Officers actually present, or, failing a sufficient number of Officers being present, from among those who have just returned from the Colonies and are about to rejoin their Corps. Officers who for urgent reasons desire to obtain an appointment in the Capital must apply in the prescribed manner through the Vice-Admirals Commanding-in-Chief, the Maritime Prefects, and the Officers Commanding troops, who transmit the applications of these Officers to the Minister with a notification from their Commanding Officers of their concurrence. These applications are only acceded to if the interests of the Service permit.

Subject to the approval of the Minister, the Maritime Prefect arranges the transfer of Officers from regiment to regiment at the same port.

Posting of Men to Companies.—The principle of the allotment of men to companies is that each company should comprise a fairly equal number of men belonging to the different classes of recruiting or of voluntarily enlisted men who terminate their period of engagement at the same time. Moreover in France each of the companies of the three 1st battalions of each regiment must be constantly main-

tained, so far as the supply of men permits, at normal peace strength. The other companies receive the absentees and non-available men (men absent on sick furlough, in hospital, &c.). The remainder of the absentees is distributed equally among the three 1st battalions.

9th, 10th, and 11th Regiments stationed in Indo-China.—The battalions of Marine Infantry in garrison in Indo-China are grouped into three regiments under the command of a Colonel or Lieutenant-Colonel. These regiments consist of three battalions of four companies, each of 150 men, and are distributed as follows :—

The 9th Regiment	at Tonkin.
The 10th	„ Annam.
The 11th	„ Cochin China.

The Administrative Staff of each of these regiments is composed as follows :—

- The Commanding Officer as President.
- The Second in Command.
- The Senior Captain.
- Two Company Captains.
- The Paymaster (a Lieutenant) as secretary.
- The Quartermaster (a Lieutenant).

These Officers are charged with all matters concerning the administration and accounts of the regiment.

The regiments in Indo-China entertain the requests for permission to re-engage put forward by the non-commissionsd Officers according to the rules followed by the regiments in France. The Administrative Staffs of the three regiments in Indo-China forward their demands for drafts to the metropolitan regiments of Marine Infantry charged with their relief; these in turn communicate with the Minister through the Maritime authority.

The General Commanding-in-Chief the troops deals with the reduction and punishment of non-commissioned officers serving in the regiments in Indo-China. The procedure in the case of re-engagement, reduction, punishment, &c., followed for non-commissioned officers in Indo-China is applicable to the non-commissioned officers of Native troops (the Annam and Tonkin Rifles). Each regiment in Indo-China is entitled to certain annual allowances for regimental schools and libraries, which are fixed as follows :—

1. Fencing school	1,128 f.	} In Cochin China, Annam, and Tonkin.
2. Gymnasium	168 „	
3. School of musketry	276 „	
4. Swimming, dancing, and buglers' schools	100 „	
5. Schools and regimental libraries ...	2,184 „	

As regards clothing, the regiments in Indo-China forward their demands to the Clothing Department.

Necessaries are arranged for regimentally as much as possible.

If this cannot be done in the case of certain articles, the corps forward their demands to the Minister, who takes steps to provide them.

12th (New Caledonia) Regiment. Battalions, Companies, or Detachments in the other Colonies.—The relationship between these corps and the regiments at home is analogous to that of the latter with the regiments in Indo-China, and conversely.

Organization and Functions of Companies of Instruction.

Constitution.—In order to accelerate as much as possible the practical and theoretical instruction of young soldiers capable of advancement, a company, called a company of instruction, is detailed permanently in each of the regiments of Marine Infantry in France. The company receives, one month at least after their arrival in the corps—

I. The most intelligent and vigorous young men best fitted for command, whether called up or voluntarily enlisted, who have undergone an examination as described below.

All young soldiers of a contingent, together with voluntarily enlisted men, three or four days after their arrival, undergo an examination to enable their degree of knowledge to be determined.

The examination consists of—

1. Copying a set piece. 2. A few lines of dictation. 3. The four rules of arithmetic.

II. Young soldiers who not having been accepted after their first month of service have since given proofs of intelligence and aptitude for command.

Young soldiers who have passed the above examination are especially watched by the Officers and by all ranks of their company, and those among them who, during one month at least, have shown themselves worthy of advancement, are admitted to the company of instruction, by order of the Colonel, on the recommendation of the Captain of the company.

The strength of the companies is not limited; it should be at all times sufficiently high to satisfy all the obligations of the regiment at home and in the Colonies.

Establishment of Companies of Instruction.—The Officers of the companies of instruction are nominated by the Minister who selects them from special lists kept by the Inspectors-General.

Selections are made principally from the Officers who have recently returned from the Colonies, in order that changes may be made as seldom as possible. The selected Officers give all their attention to the company, and are excused garrison duty. When they reach the top of the roster for Colonial service they may, on the recommendation of the Commanding Officer, be retained in their company in order to complete a term of three years in it. If an Officer quits the regiment on promotion or for any other cause, the fact is reported to the Minister, who, failing a candidate nominated by the Inspector-General, selects an Officer from a list kept for this purpose by the

Commanding Officer. Non-commissioned officers, re-engaged if possible, chosen from the best instructors, and who are desirable in every way, are attached to the company. They must remain a year, and are not removed except for incompetence, misconduct, or on promotion. They, like the Officers, are exempt from all other service in the regiment, and only mount guard with the men they instruct.

The duty Officers and non-commissioned officers remain only one year with the company, but to foster *esprit de corps*, they are relieved in succession and not in a body.

The composition of the staff of each company of instruction is fixed as follows:—

1 Captain, 1 Lieutenant, 1 Sub-Lieutenant, 1 sergeant-major, 1 senior sergeant, 8 sergeants, 1 quartermaster-sergeant, 16 corporals.

Course of Instruction.—The Officer Commanding the company is entirely responsible for the instruction of his company. He endeavours to give the students a complete military education.

The number of non-commissioned officer instructors enables him to divide his company into as many classes as are necessitated by the aptitude and intelligence of the students and their date of joining. The classes are so arranged that at the end of four months the students have completed the course of instruction summarized below (p. 1411).

At the end of three months the most intelligent students can be utilized in instructing the elementary classes. On the first of each month the Captain renders a detailed return to the Colonel showing the work done during the past month by each class in the company.

Instruction of Students as Soldiers.—Individual instruction is given to the students with the greatest care, bearing in mind always that to make efficient instructors in the future, it is above all necessary to turn out smart soldiers who shall be examples and models as much by their bearing and conduct as by their skill at arms. Sufficient soldiers are attached to each company to do fatigues during the hours of instruction and to carry out the minor duties which are indispensable in each company. A great portion of the time is given to musketry. The students, two months after joining, take part in garrison duty at the rate of two guards per month. This duty is performed by portions of the company under their accustomed instructors, and serves as a practical demonstration during twenty-four hours of that which they have been taught in theory.

Field training is taught in all its branches. The students carry out, under conditions as nearly those of active warfare as possible, and in the neighbourhood of their garrison, the practical duties of camp and bivouac, each scheme lasting twenty-four hours.

In order to develop the activity and strength of the students to the utmost, in addition to the usual physical drill, which is taught them with particular care, they are exercised at gymnastics every other day under the superintendence of the sergeant-major. When the weather is favourable they are taught swimming. Fencing is taught them three times a week. For battalion drill, drill in extended order,

&c., requiring a larger body of men, the company of instruction is joined to the other companies of the regiment.

Training of the Students as Instructors.—The subjoined table shows the knowledge, both theoretical and practical, which the students must possess as instructors. They only commence to qualify as instructors in the different subjects when their training in each of them as soldiers is complete. Theoretical study does not commence until they are familiar with the practical movements in each part of the instruction. Giving detail for the various drills and exercises in the class rooms, or preferably out of doors, is made as practical as possible.

The student instructor, standing before one or more students representing men to be instructed, himself performs what is prescribed by the instructor. He recites, in a commanding voice, the detail of the movement, commencing with the words, "At the Order," then sees it carried out, and corrects mistakes if necessary. The movements of the rifle exercise are learnt with the weapon in the hands, each movement being performed as the detail for it is given. This procedure facilitates instruction, combining as it does a knowledge of drill and detail, and at the same time imparts a good word of command. It enables the students to understand what they learn and recite, and is a powerful aid in a study which is unpleasant at its commencement, and which often rebuffs and discourages them. It only remains to them to acquire the habit of command, the *coup d'œil* necessary to direct a squad under all circumstances of ground, and facility in bringing to the notice of the men quickly and clearly the principles they have already learnt theoretically. The duties of corporal of the guard are taught at the guard room.

Classification.

At the end of each month the students who have finished the period of four months with the company, undergo an examination before a Board detailed by the Commanding Officer of the regiment, and composed as follows:—

A Lieutenant-Colonel, president, two Captains, one of whom is the Captain of the company of instruction, two Lieutenants or Sub-Lieutenants, one of whom is taken from the company of instruction.

As a result of this examination, the Board arranges a classification of the pupils, taking the mean of the marks allotted by each of the members. Marks are given according to the following scale:—

Very bad indeed.....	0
Very bad.....	1
Bad.....	2, 3, 4
Fair.....	5, 6, 7, 8
Pretty good.....	9, 10, 11, 12
Good.....	13, 14, 15
Very good.....	16, 17, 18
Excellent.....	19, 20

Co-efficients are assigned to the different subjects according to their importance (p. 1412), and the mean of the marks allotted by the Board for each subject multiplied by the corresponding coefficient, when totalled, serves to establish the student's classification. Students obtaining a mean of less than twelve points are rejected for inefficiency, or they may, if recommended by the Captain, be retained for an additional month with the company. This indulgence is only accorded once. At the end of each monthly classification, the Board address a report to the Commanding Officer on the state of efficiency attained by the pupils. The soldiers who pass are nominated as early as possible "first class" soldiers, and are distributed as lance-corporals among the companies in which vacancies of the lowest rank either exist, or are about to occur within a short time. As far as possible, the students are posted to companies other than those they joined on enlistment. A month after joining the service companies, they receive from their Captain a certificate showing the manner in which they have served and their aptitude for command. This certificate is combined with that from the Captain of the company of instruction to form a mean certificate of efficiency from which the Lieutenant-Colonel compiles a list showing the relative efficiency of all the "student" corporals of his battalion. This final classification is made known in orders, and from this list alone promotions are made.

A certain number of these student corporals form part of each detachment sent to the Colonies. Students are only retained in the company of instruction on showing at all times proofs of good conduct, industry, and aptitude, and the Officers Commanding regiments can remove them for misconduct, idleness, or inefficiency on the proposition of the Captain of the company of instruction, or of the Board of Examination, after conferring with the Battalion Commander and second in command. A certificate for each man, showing the date of his joining the company of instruction, and the different classifications obtained during the year, is placed in each man's pocket ledger. The fact of a student being removed for misconduct, inefficiency, or any other cause is shown on the certificate. In case of re-admission as a student either in France or in the Colonies, a second certificate is furnished.

Regiments, Battalions, and Companies of Marine Infantry in the Colonies.

In order that the marine troops in the colonies may supply the vacancies occurring in the lower ranks, Commanding Officers organize, according to the importance of the detachment placed under their orders, a company, a half company, or a section on the same lines as a company of instruction in France. The routine of these companies is followed entirely, except that the Officers, non-commissioned officers, and students continue to be borne on the strength of their respective companies.

They have no special quarters, but live with their companies;

Commanding Officers may, however, introduce any modification they may consider necessary. The results of the instruction given in the Colonies are recorded on a certificate in the pocket ledger as described above. The Officers of the instructional units and the Board of Examination are arranged as nearly as possible as they would be in France, and are selected by the Officer Commanding the troops.

The personnel of the instructional unit cannot be detained in the Colony beyond the prescribed period.

Native Troops.—The same system is followed as nearly as possible in the native regiments, the subjects to be taught are determined by the Officer Commanding the troops on the proposition of the Officer Commanding the native regiment.

KNOWLEDGE TO BE POSSESSED BY CORPORALS, WHICH KNOWLEDGE THEY MUST BE ABLE TO IMPART.

I. *Manœuvre.*

Duties of a soldier.
Duties of guides.
Position and duties of corporals.

II. *Musketry.*

Stripping and putting together the rifle in use.
Names of all parts of the rifle and cartridge.
Zones of fire.

III. *Gymnastics.*

Physical drill.
Gymnasium.

IV. *Field Works.*

Names of tools, portable tools, and engineering modelling tools.
Method of using the above tools.
Rifle pits and shelter trenches.
Application of field fortification to the defence of hedges, walls, ditches, &c.

V. *Interior Economy.*

All that concerns soldiers and corporals in the Regulations.

VI. *Duties in Garrison.*

All that concerns soldiers and corporals in the Regulations.

VII. *Duties in the Field.*

General Instruction.
Elementary exercises in reconnaissance and surveying.

- Part I.—1. General principles.
2. Sentry duty.
3. Piquets, and posts of like nature.
4. Detached posts.
5. Patrols and rounds.
6. Advanced posts.

- Part II.—1. General principles.
2. Order of march of a company of infantry.
Composition and distance of the different portions.
Duties of point and head of advanced guard.
Measures for security on halting.
Rear guard.
Retreats.

- Part III.—1. Definitions.
2. Cantonments.
3. Bivouacs.

VIII. *Use of Pocket Ledger.*

IX. *Military obligations of Men on Furlough and of Reserve Men.*
Instruction concerning administration and mobilization of Reserve men.

X. *Company Accounts.*

This portion is only taught to men capable of performing Pay Office duties.

XI. *Elementary Course of Map Reading.*

Conventional signs.

Table of Co-efficients.

Duties of the soldier (theoretical and practical)	..	..	..	..	..	..	..	..	8
Musketry instruction (theoretical and practical)	..	..	..	..	..	..	..	..	5
Physical drill	..	..	..	..	..	..	..	..	4
Field works	..	..	..	..	..	..	..	..	4
Interior economy	..	..	..	..	..	..	..	..	3
Duties in garrison	..	..	..	..	..	..	..	..	3
Duties in the field	..	..	..	..	..	..	..	..	5
General manner of performing duty and aptitude for command							..	..	12
Conduct	..	..	..	..	..	..	..	..	7
General bearing	..	..	..	..	..	..	..	..	3
Signalling	..	..	..	..	..	..	..	..	1
Company accounts	..	..	..	..	..	..	..	..	1

Form of Certificate.

_____ Regiment of Marine Infantry. Corps stationed at _____.
Joined company of instruction (date) _____.
Obtained (No. of Marks) _____.

Classification.—Order of merit, _____ out of _____ students.

Final Classification.—Order of merit, _____ out of _____ students.

Place . Date .

A. B.,
Colonel.

“*Dépôt des Isolés,*” at Toulon.

This dépôt forms a company attached to the 4th Regiment of Marine Infantry.

The Permanent Staff is organized as follows :—

- 1 Captain who acts as paymaster.
- 1 Lieutenant or Sub-Lieutenant.
- 1 sergeant-major.
- 1 senior sergeant.
- 1 quartermaster-sergeant.
- 3 sergeants.
- 3 corporals.
- 1 bugler.
- 10 privates.

The Officers are nominated by the Minister. The Captain is chosen from among the Officers of this rank of tried administrative capacity.

The non-commissioned officers, buglers, and privates are chosen by the Colonel of the 4th Regiment. Officers and men leaving the dépôt for a period exceeding thirty days are replaced, otherwise they remain attached to it for one year. The Captain is under the command of the Colonel of the 4th Regiment for all matters connected with the interior economy, discipline, and instruction of the company. However, to avoid delay, he may communicate direct with the Major-General, informing the Colonel that he has done so. The Lieutenant or Sub-Lieutenant acts as second in command, and fulfils the duties of Adjutant in the barracks occupied by the *isolés*. One of the three sergeants is baggage-master, and one of the corporals acts as assistant to the Quartermaster. The men of the dépôt are accommodated in barracks set apart for them by the superior local authority, who takes care to ensure the well-being of the men passing through—convalescents and others. For this purpose the quarters are provided with regulation bedding and furniture. A Naval Medical Officer is attached to the dépôt.

Although forming a company belonging directly to the 4th Regiment, the “Dépôt des Isolés” constitutes a secondary portion of this regiment in the matter of payment and administration.

Soldiers of regiments of Marine Infantry, other than the 4th, together with men belonging to special corps, are attached to the dépôt for pay, allowances, and rations. Men belonging to the Annam rifles are arranged for by special regulations. Arms, clothing, equipment, and necessities are furnished by the 4th Regiment, as they become necessary. Repairs of all kinds to arms and equipment are carried out in the workshops of the 4th Regiment at the current rates. The following allowances are granted by regulation:—

To the Captain-Paymaster, for purchase of books, office allowance, rent of office, &c., 1,710 francs. To the baggage-master 50 centimes per diem.

NATIVE AND SPECIAL CORPS.

Senegal Rifles.

A body of native infantry is kept up in Senegal, and forms a military unit which contributes to the defence and internal security of the Colony. It originally consisted of ten companies forming two battalions, but in August, 1890, the number of companies was increased to twelve, forming three battalions.

The staff of the regiment comprises —

Lieutenant-Colonel Commanding	1
Majors	2
Senior Captain	1
Lieutenant (Paymaster)	1
Lieutenant (Quartermaster)	1
Sub-Lieutenant (Assistant to Paymaster)	1
Assistant Surgeons	2

Nine companies garrison Senegal, the tenth is at Porto Novo. The strength of the Senegal companies is:—

European.		Native.	
Captain.....	1	Lieutenant or Sub-Lieutenant	1
Lieutenant.....	1	(There are 2 native Lieutenants and 7 native Sub-Lieutenants in the regiment.)	
Sub-Lieutenant.....	1		

Non-commissioned Officers and Men.

European.		Native.	
Sergeant-major.....	1	Sergeants.....	4
Quartermaster-sergeant.....	1	Corporals.....	8
*Sergeants.....	6	Bugler.....	1
Buglers.....	3	Riflemen.....	120
		Boys.....	2

The Porto Novo Company comprises—

European.		Native.	
Captains.....	1	Nil.	
Lieutenants or Sub-Lieutenants.....	2		

Non-commissioned Officers and Men.

European.		Native.	
Sergeant-major.....	1	Sergeants.....	3
Quartermaster-sergeant.....	1	Corporals.....	6
Sergeants.....	4	Bugler.....	1
Buglers.....	2	Riflemen.....	81
		Boy.....	1

The strength of this company may be increased by the Minister of Marine to that of the Senegal companies.

At Medine, about 300 miles up the Senegal river, there is a clothing dépôt in charge of a Lieutenant. The European soldiers are taken from the Marine Infantry, the non-commissioned officers are, when possible, selected from among those who have re-engaged, and are furnished exclusively by the two regiments stationed at Brest.

Europeans remain two years at Senegal, and one year at Porto Novo, exclusive of the time occupied in going and returning. The French Officers and non-commissioned officers always command natives of corresponding rank. The command of a company, even though it be only temporary, must always be exercised by a European Officer. Native Officers draw the same pay and allowances as European Officers of corresponding ranks. Recruiting in the corps is

* The Company of Instruction has ten sergeants.

carried out by means of voluntary enlistment and by re-engagement among the Senegal natives. The regulations concerning discipline, jurisdiction, &c., are the same as those obtaining in the Marine Service. The native troops are treated in the same manner as soldiers of the Marine Infantry in the matter of the Legion of Honour and military medal, and they draw the allowances which these distinctions carry. They receive pensions and half-pay in cases provided for by regulation. Administrative control is exercised by the Colonial Commissariat, questions of organization, promotion, police, discipline, uniform, and armament are decided by the Minister.

Source of Supply of Officers, Non-commissioned Officers, and Men of the European Permanent Staff.

As mentioned above, the European Officers, non-commissioned officers, and men are selected from the Marine Infantry, the non-commissioned officers being chosen as much as possible from among those who have re-engaged, belonging to the regiments stationed at Brest. The Officers are nominated by the Minister of Marine, and the non-commissioned officers and men by the Vice-Admiral Commanding-in-Chief, who details them equally from the two Brest regiments. They remain on the strength of the Marine forces, and are subject to the regulations of that service, except in the matter of pay and clothing. Should the Officer commanding the troops in Senegal consider it expedient, he may order any interchange of non-commissioned officers between the Senegal Rifles and the Marine Infantry stationed in Senegal.

Recruiting Natives.—The native Officers are selected from native non-commissioned officers recommended for promotion, and are nominated by the President of the Republic.

Recruiting of the riflemen is carried out—

1. By voluntary enlistment of natives of Senegambia.
2. By re-engagement of time-expired riflemen, who wish to remain in the Service.

Voluntary enlistment is for two, four, or six years, and carries bounties of 80, 180, and 300 francs, payable on attestation. The period of re-engagement is for two, four, or six years, and carries the same bounties as are awarded for voluntary enlistment; half is payable at the time of re-engaging, and the remainder when the period of re-engagement commences.

The conditions of enlistment and re-engagement are explained to the recruit and to two native witnesses, by an interpreter, in the presence of a Captain.

Creoles of Martinique, Guadaloupe, and Guiana, as well as Algerians, may not now enlist in the Senegal Rifles, but any now serving may re-engage if the Officer Commanding considers them efficient. Every non-commissioned officer and rifleman receives a regimental number on being posted to a company, and is furnished

with a small book, showing a statement of his accounts, and the amount of equipment, &c., supplied to him.

Pay and Allowances.—The Officers, both European and native, are entitled to the same pay, marching money, and field allowances as the Marine Infantry battalions stationed in the Colony. European non-commissioned officers and men are entitled to the same pay and marching money as the Marine Infantry, sergeant-majors drawing field allowances according to the same scale, in addition. Native non-commissioned officers and men draw half-pay when on furlough or in hospital. They draw no pay when absent without leave, in a state of desertion, or when absent over furlough without due cause. Full pay is given to European soldiers and to re-engaged natives on all occasions of absence with leave.

Rations.—European Officers, non-commissioned officers, and men draw the same rations as those allotted to the European troops. Natives are entitled to a daily allowance in lieu of rations of 1 f. for non-commissioned officers, and 80 c. for men and boys. At any time, on the advice of the military authorities, the Governor of the Colony may stop this allowance, and give the men their rations in kind. Native non-commissioned officers receive the same rations as Europeans of the same rank; riflemen and boys receive the same rations as European privates, but without wine. Mounted Officers receive forage in kind.

Payment.—Pay and money allowances are drawn monthly in arrears; the men are paid by the company Commanders every five days in arrear. Commanders of battalions, and detachments on their own responsibility, pay all allowances due to those under their command.

Clothing.—Every native receives, at the time of enlistment, a suit of clothing, which is kept up by a daily stoppage, due at all times when pay is drawn. The object of this arrangement is to provide the soldier with kit and necessaries, and to effect repairs in equipment and arms which are the property of the State, when these repairs are necessitated by the fault of the man.

General Maintenance Fund.—This fund, kept up in the Senegal Rifles, forms a common purse, to defray corps expenses. The principal expenses which it defrays are—

1. Band expenses.
2. Lighting the interior of the barracks, and such outside lighting as is not provided for otherwise. Illumination for the national fête.
3. Keeping up clothing and equipment, and hair cutting.
4. Shoeing and veterinary attendance for horses of mounted Officers, the property of the State, and for bât horses.
5. Balancing deserters' accounts.
6. Starting and keeping up the mess of the European permanent Staff, regimental schools, libraries, and hospitals.

Uniform.—Europeans retain the clothing and equipment of the Marine Infantry.

Native Officers. Review order :

1. The chéchia.*
2. A light blue vest, of Arab pattern, braided and laced with gold. Sleeves open under the forearm, and fastened with buckles. The rank is shown by gold braid, forming a Hungarian knot.
3. A waistcoat, called "sédria," of Arab pattern, of light blue cloth, with yellow stripes on each side.

Drill Order.—Straight trousers, of white linen or blue flannel, instead of the peg-top trousers worn in review order. No ornaments. The rank stripes are in gold, placed round the sleeve. Boots are replaced by shoes, or laced half-boots. A common cap replaces the chéchia for daily use.

Native Riflemen.—In review order this consists of—

1. The chéchia.
2. A zouave jacket.
3. A frock of royal blue cloth, edged with yellow.
4. Royal blue trousers, with yellow stripe.
5. A broad yellow woollen girdle.
6. Shoes with white linen gaiters.

In drill order they wear a khakee frock, ornamented with a yellow stripe on the collar and on the sleeves, khakee trousers, of as small dimensions as are compatible with their oriental pattern.

Up country riflemen wear drill order only, and the daily stoppage towards the general maintenance fund is consequently reduced from 50 c. to 30 c. Men told off to serve up country ("haute fleuve") only take the chéchia, khakee frock, and trousers, and a blue cloth frock. All other articles of review order are kept packed in bales, in the clothing store at St. Louis (mouth of the Senegal river). The shoes and white gaiters are replaced by a pair of sandals. For wear during the cold nights, from December to March, riflemen serving up country draw a warm knitted jersey, at the expense of the general maintenance fund. This garment is worn under the blue cloth frock. Field service gaiters, of strong linen, are served out when necessary.

All clothing and equipment is marked with the regimental number of the owner.

All repairs of clothing and equipment are effected in the regimental workshops at a fixed tariff.

The camp and other equipment of native riflemen is the same as that of the Marine Infantry, but no havresack is provided. The 48 portable tools carried by a company of Marine Infantry are replaced by 2 picks, 4 shovels, 4 axes, 4 billhooks, and 2 saws. On the march, these tools are carried by the transport.

Arms.—European Officers, sergeant-majors, and senior sergeants carry the same arms as similar ranks in the Marine Infantry. Non-commissioned officers and riflemen, European and native, are armed

* A red cap, such as is worn by the French troops in Algeria and by Zouaves.—
H. D. D.

with the rifle, pattern 1866-1874; a certain number carry the magazine rifle of 1878 pattern.

Superior Officers are mounted as in the Marine Infantry: subaltern Officers are only mounted when on active service.

Duties of the different Ranks.—The Lieutenant-Colonel Commandant is invested with the same authority over the personnel, both European and native, as the Colonels of regiments of Marine Infantry are empowered to exercise. He enjoys the same prerogatives, issues orders, and keeps up, among the different companies, a uniform system of instruction, interior economy, and discipline. He inspects the different companies at their stations as frequently as possible. He keeps the Colonel Commanding the troops informed of the efficiency and discipline of the corps, and furnishes him with the states required by regulation. He renders monthly a numerical state of the Europeans and natives serving in the corps, and makes any suggestions he may deem necessary regarding recruiting.

The other ranks carry out their duties as provided for in the Marine Infantry. If a Major is absent his duties are performed by the Senior Captain of his battalion. In the absence of a Captain the command of a company can only be exercised by a European Officer detached, if necessary, from another company. A native Officer cannot, under any circumstances, take command.

Medical Staff.—Two Assistant Surgeons are attached to the Senegal Rifles. They have charge of the regimental infirmaries, in which most of the native riflemen are treated so as not to encumber the hospitals.

System of Command.—European Officers and non-commissioned officers always command natives of corresponding rank. When a native wishes to make a complaint against a European of a rank inferior to his own, he reports the circumstances to his Captain, who deals with the case. If the European and native belong to different companies, the Lieutenant-Colonel Commandant decides on the case.

Regulations in Force.—The instructions for field manœuvres, musketry, military training, interior economy, discipline, reduction of non-commissioned officers, &c., in use in the Marine Infantry are applicable to the Senegal Rifles; a native, however, cannot be relegated to the disciplinary company. Europeans who have been reduced are sent to the battalion of Marine Infantry stationed at Senegal. Native riflemen may be dismissed by the Colonel Commanding the troops for inefficiency or misconduct.

Promotion of Europeans.—European Officers retain their place on the list of Officers of Marine Infantry for promotion by selection or by seniority.

Vacancies in the non-commissioned ranks are filled up as much as possible regimentally, but when no qualified candidates are available in the Senegal Rifles, the Colonel Commanding the troops nominates men of the Marine Infantry in garrison for promotion into the corps, preference being given to men who can speak the language.

Promotion of Natives.—Promotion to Commissioned rank is conferred by the President of the Republic on the recommendation of the

Minister. No rifleman can be promoted to Lieutenant or Sub-Lieutenant unless he has served at least two years in the next lower rank, and has been recommended for advancement by the Inspecting General. The candidates must, moreover, pass an examination. The only exception to the above rules is in case of promotion for good service in the field.

Non-commissioned Officers.—All promotions in the non-commissioned ranks are conferred by the Commanding Officer, and the conditions are the same as those obtaining in the Marine Infantry.

Pensions.—The regulations regarding pensions which are in force in the Marine Service are applicable to both Europeans and natives serving in the Senegal Rifles.

Annam Rifles.

The Annam Rifles are formed for the defence and internal security of Cochin China. The force consists of a regiment of three battalions, each of four companies, commanded by a Colonel or Lieutenant-Colonel. The strength of each company never falls below 200 men, and may amount to 250 men. The regimental Staff consists of—

- 1 Colonel or Lieutenant-Colonel Commandant.
- 3 Majors.
- 1 Senior Captain.
- 1 Lieutenant (Quartermaster).
- 1 Lieutenant (Paymaster).

The establishment of each company is as follows:—

	European.	Native.
Captain.....	1	—
Lieutenant.....	2	1
Sub-Lieutenant.....	—	1
Sergeant-major.....	1	—
Quartermaster-sergeant....	1	—
Sergeants.....	8	1 (per squad of 16 men).
Corporals.....	—	1 " "
Quartermaster-corporal....	—	1 " "
Riflemen.....	—	200—250
Buglers.....	—	2
Recruit buglers.....	—	2

European Officers are selected from among those Officers of the Marine Infantry who are judged most fitted for this particular duty, and who are recommended by the Inspectors General of the arm. They are nominated by the Minister, and remain on the strength of their own regiment. The two regiments of Marine Infantry at Brest furnish the reliefs of non-commissioned officers and men of the Annam Rifles.

Pensions.—Native soldiers of all ranks of the Annam Rifles who have served 15 years in the corps, or in the now disbanded Militia, are

discharged, and are entitled to a pension paid by the Colony. Native Officers, if physically and professionally fit, may remain in the service until they have completed 20 years. For each year of service beyond 15, they receive an increase of 1-15th of the pension of their rank.

Recruiting.—Recruiting is territorial; according to the custom of Annam, each commune is responsible for its contingent with the colours, the strength of the contingent being fixed annually by the Governor. The period of service is 2 years. Every man offered for enlistment must fulfil the following conditions:—

1. His age must be between 21 and 28 years.
2. He must be healthy and strong.
3. He must be of good character.

Re-engagement.—Natives, having completed their time of service with the colours, may be re-engaged with the consent of the Officer Commanding, provided they are desirous of continuing in the service, and their conduct has been such as to merit the indulgence. They cannot, however, remain with the colours longer than 15 years.

Non-commissioned officers and men who have re-engaged receive a bounty of 50 f. and an increase of pay of 10 c. per diem for non-commissioned officers, and 5 c. per diem for privates. For each subsequent re-engagement they receive a like increase of pay, but no further bounty is given.

Distribution of Companies.—This is arranged by the Governor. Each company is stationed as far as possible, if necessary a portion at a time, in the territorial district whence it is recruited. In the event of war, or if the internal security of the Colony demands it, the companies may be removed by the Governor, returning when there is no further cause for their detention elsewhere.

Pay.—Officers and non-commissioned officers of the Annam Rifles receive, in addition to all other pay and allowances, special pay according to the following scale:—

	Francs.
Lieutenant-Colonel or Colonel	2,000
Major	1,500
Captain	1,250
Lieutenant	750
Sergeant-major	425
Sergeant	375

Officers and non-commissioned officers nominated for the Annam Rifles reckon their service in that corps from the date of quitting their regiments in France. Up to the day of their embarkation they are attached to the “*Dépôt des Isolés*” at Toulon. On returning, they continue to count service in the Annam Rifles until they rejoin their original regiments, drawing their pay and allowances from the “*Dépôt des Isolés*” at Toulon.

Uniform.—Europeans wear the uniform and arms of the Marine Infantry. Native Officers and men wear the uniform of the old militia, with the exception of some modification of detail. Marching order is the same as that of the Marine Infantry, without the havre-

sack. Native Officers may, at their request and on repayment, be served out with the same arms as are used by the Officers of the Marine Infantry.

Non-commissioned officers and men carry the carbine of 1874 pattern, sergeants being provided, in addition, with the revolver of 1878 pattern. All repairs are carried out by armourers, who are placed at the disposal of the Colony by the Marine Infantry.

Quarters.—All barracks are kept up at the expense of the Colony. The Europeans are quartered in a defensible post, serving as a redoubt in case of need. The Officer Commanding the troops is responsible that all barracks are kept in a perfect state of defence and in good repair. The riflemen are quartered, with their families, round the defensible post. They build their own quarters from materials furnished by the Colony.

Rations.—Soldiers, both European and native, receive no allowance in kind, their pay being calculated to make up for this. On the march, a daily allowance may be granted in certain cases, and Europeans may be permitted by the Governor to draw on the State magazines, on repayment, in case of necessity.

The daily marching money may be replaced by rations; in this case, the Europeans receive the rations allowed to French troops on active service; the composition of the rations for natives is arranged beforehand by the Governor.

Discipline.—The Officer Commanding exercises the same authority, and enjoys the same prerogatives, as the Colonels of the regiments of Marine Infantry. He frequently inspects the companies at their own Headquarters. In the absence of the Captain the command devolves on the Senior Lieutenant; in no case can the command be exercised by a native Officer, and, if necessary, an Officer may be detached from another company.

If the interests of the Service demand it, a Lieutenant may be detailed to serve as Adjutant with each battalion. The Officer Commanding resides at Saigon; the Headquarters of battalions are fixed by the Governor; European Officers and non-commissioned officers command natives of corresponding rank.

The drill and musketry regulations are the same as those in force in the Marine Infantry—the regulations of which, regarding interior economy, are applicable to Europeans; in the case of natives, these regulations are drawn up by the Governor as required. All crimes are dealt with by immediate Commanding Officers. The reduction of non-commissioned officers is carried out according to the rules laid down for guidance in the Marine Infantry.

Riflemen may be discharged for misconduct, or if physically unfit, by order of the Governor; the commune furnishing men so discharged is responsible that they are replaced.

Promotion.—The Sergeant-Majors are selected from the European non-commissioned officers serving in the regiment. After serving two years in the Annam Rifles, European non-commissioned officers may, if recommended, be transferred to a regiment of Marine Infantry, with the rank of Sergeant-Major, provided they are recom-

mended for advancement. Promotion of natives, other than Officers, takes place in the company to which they belong.

The rules for promotion are as follows:—

No soldier may be promoted to corporal unless he has served at least six months as a rifleman, and can understand and speak French, and write either French or “Quoc-ngu.” No soldier may be promoted sergeant unless he has served at least six months as corporal or quartermaster-corporal, and can speak and understand French.

No non-commissioned officer can be promoted Lieutenant or Sub-Lieutenant unless he has served at least two years in the next lower rank, and has been recommended for promotion by the Inspector-General.

Native non-commissioned officers recommended for the rank of Sub-Lieutenant must, in addition, pass an examination, the nature of which is determined locally.

There are two classes of Lieutenants and Sub-Lieutenants—promotion from class to class takes place by seniority. These regulations for promotion are strictly adhered to, except in the case of good service or great bravery in the field. The ranks of native Lieutenants and Sub-Lieutenants are conferred by the Minister of Marine on those candidates whose names are entered on the promotion list of the Inspector-General. Promotions from class to class are granted by the Governor. All other promotions in the lower ranks are carried out by the Officer Commanding the regiment.

Honorary Rewards.—Natives of all ranks are eligible for the Legion of Honour and for the military medal, together with all the advantages they confer.

Tonkin Rifles.

This corps consists of three regiments of native infantry, and provides for the defence and internal security of Tonkin. Each regiment consists of four battalions of four companies each. The Staff of each regiment comprises—

- 1 Colonel or Lieutenant-Colonel.
- 4 Majors.
- 1 Senior Captain.
- 1 Lieutenant (Paymaster).
- 1 Lieutenant (Quartermaster).

And the strength of each company is made up as follows:—

	European.	Native.	
Captain	1	—	} Total, all ranks, 265.
Lieutenant or Sub-Lieutenant	2	1	
Sub-Lieutenant	—	1	
Sergeant-major	1	—	
Quartermaster-sergeant	1	—	
Sergeants	8	8	
Corporals	—	18	
Buglers	—	2	
Riflemen	—	220	
Recruit buglers	—	2	

Europeans are selected from among those Officers and men of the Marine Infantry recommended for employment in the Tonkin Rifles at the Annual General Inspection. Officers are nominated by the Minister, non-commissioned officers and men of the non-combatant section by the Maritime Prefects, those of the 1st, 2nd, and 3rd Regiments are drawn from the Marine Infantry stationed at Cherbourg, Rochefort, and Toulon respectively.

Europeans draw extra pay, on the scale laid down for the Annam Rifles.

Each rank of native Officers and non-commissioned officers is divided into two classes, equal in number.

For the relief of European Officers of the Tonkin Rifles, 259 Officers are borne on the strength of the Marine Infantry, viz. :—

Colonels or Lieutenant-Colonels	6
Majors	24
Captains	76
Lieutenants	153
	<hr/>
	259

Sepoys.

The body of native infantry maintained in the French Settlements in India, under the name of “Sepoys,” comprises only one company, of which the composition and strength are fixed as follows :—

Staff.

1 Captain commanding the force	} 2
1 Lieutenant or Sub-Lieutenant (Paymaster and Quartermaster)	

Strength of Company.

Officers	{	Lieutenants (Europeans)	2	}	4
		1 Native Lieutenant and 1 Native Sub-Lieutenant	2		
Natives	{	Sergeant-major	1	}	160
		Sergeants	5		
		Quartermaster-sergeant	1		
		Corporals	12		
		Drummers	2		
		Privates (including 16 bandsmen)	139		

Total strength, 166.

European Officers are selected from the Marine Infantry ; they are nominated by the Minister, and remain on the strength of their own arm. They always command native Officers, and no native Officer can at any time command the company. Native Officers are selected by the President of the Republic. Recruiting is carried out by voluntary enlistment, for three, four, or five years, and by re-engagement for two, three, or five years. The qualifications required for re-engagement are—

1. The man must be in his last year of service.
2. That he is physically fit for continuing in the Service.
3. That he has always borne a good character.
4. That the Captain Commanding consents to his re-engaging.

The soldiers are eligible for the Legion of Honour and the military medal, together with the gratuities which they carry, in the same manner as men of the Marine Infantry.

They receive pensions and gratuities in accordance with the regulations. Soldiers undergoing imprisonment, except for desertion, are entitled to pay during their detention.

The corps consisted formerly of two companies, the two native Officers who became supernumerary, on reduction of the establishment, have been permitted to remain in the Service until they are able to retire. The reduction in the lower ranks is taking place gradually; vacancies which occur are not filled up, and in two or three years it is calculated that the corps will be reduced to the regulation strength.

The Captain Commandant resides at Pondicherry, and has all the powers of the Officer Commanding a battalion. He inspects the several detachments of the company, at their respective stations, twice a year, at uncertain times, and renders a monthly state of the company to the Minister, through the proper channel. In case of absence the Captain's place is taken by the Senior European Lieutenant; he is not considered absent while making a tour of inspection. No native can be promoted to the rank of Lieutenant or Sub-Lieutenant unless he has served at least two years in the next lower rank, and has been recommended for advancement in the usual manner. Promotion from class to class takes place by seniority.

Gaboon Rifles.

This force consists of one company only, of which the composition and strength are fixed as follows :—

Staff.

1 Captain commanding the force	}	2
1 Lieutenant (Paymaster and Quartermaster) ..		

Strength of Company.

Officers.

European.			Native.	
Captain	1	} 2	Lieutenant or Sub-Lieutenant	1
Lieutenant	1			

Rank and File.

Sergeant-major	1	} 8	Sergeants	2	} 111
Quartermaster-sergeant .	1		Corporals	8	
Sergeants	5		Bugler	1	
Bugler	1		Riflemen	100	

Total strength of company, 122, all ranks.

Europeans are selected from the Marine Infantry—non-commissioned officers being chosen as much as possible from re-engaged men belonging to the two regiments at Rochefort. The tour of service at the Gaboon is fixed at one year, exclusive of the time passed on the voyage out and home.

European Officers and non-commissioned officers command natives of similar rank, and the command of the company, even as a temporary measure, can only be exercised by a European Officer. Recruiting is carried out by voluntary enlistment and by re-engagement.

The regulations which apply to this company are the same as those in force for the Senegal Rifles.

Sakalave Rifles.

This force consists of one company commanded by a Captain of Marine Infantry. The Europeans for this company are supplied directly by the battalion of Marine Infantry stationed at Diego Suarez, their places being taken by drafts from the regiments at Toulon. The number of Europeans is proportioned to the number of natives enrolled; the strength has not yet been definitely determined.

NAVAL DISCIPLINARY COMPANIES.

Men of the Marine Artillery and Infantry who, without being guilty of crime sufficiently grave to merit trial by Court-Martial, continue, nevertheless, to commit petty offences which cannot be prevented by summary punishment, and which set a bad example in their regiments, are drafted into the naval disciplinary company. Men who mutilate themselves, or who persist in feigning disease with a view to being invalided, are also sent to the disciplinary company.

Sailors and men belonging to the fleet either afloat or ashore, are dealt with in the same manner as marines, provided they have still two months to serve; if they are within sixty days of completing their engagement, they may be imprisoned until the date of their discharge. Sailors and marines serving beyond the seas are not sent to the disciplinary company. The only exception to this rule is in the case of men in garrison at Martinique, Guadaloupe, and Guiana.

The composition and strength of the company are fixed as follows:—

I. Martinique.

- 1 Captain.
- 2 Lieutenants.
- 1 sergeant-major.
- 5 sergeants.
- 1 quartermaster-sergeant.
- 5 corporals.
- 1 bugler.
- 3 orderlies.
- Labourers (variable strength).
- Fusiliers „ „

II. *Saintes Islands (near Guadaloupe).*

- 1 Lieutenant.
- 1 Sub-Lieutenant.
- 1 sergeant-major.
- 5 sergeants (one performing duties of a quartermaster-sergeant).
- 5 corporals.
- 1 bugler.
- 2 orderlies.
- 62 fusiliers.
- 19 pioneers.

III. *Oléron Dépôt.*

- 1 Lieutenant.
- 1 sergeant.
- 2 corporals.
- 1 orderly.
- 25 fusiliers.

The Officers are nominated from the Marine Infantry by the Minister, and take promotion in their own corps. Lieutenants and Sub-Lieutenants must have served one year in their rank, and the Captains two years. They receive extra duty pay, which is only drawn for the period actually present and for absence occasioned by the public service, in addition to the emoluments of their rank. The rates of extra pay are fixed as follows :—

	France.	Colonies.
Captains.....	1,620 f.	2,016 f.
Lieutenants.....	792	792
Sub-Lieutenants	180	432

Sergeants are chosen from among those who have re-engaged or from among the corporals of the company who have been recommended for the rank of sergeant. Corporals nominated for the disciplinary company must have served six months in their rank. Buglers are drawn from the Marine Infantry, and can, if necessary, act as corporals. All ranks receive extra pay.

Transfer of Fusiliers to the Pioneer Section.—The pioneer section is organized to receive those men who, by the nature of their crimes or by their bad conduct, require a more severe discipline. When it is necessary to transfer a man to the pioneer section, the case is referred to a “Court of Discipline,” presided over by the Captain and composed of six members chosen from among the Officers present and the most senior sergeants.

Uniform.—Officers, non-commissioned officers, and buglers of the disciplinary company wear the uniform of the Marine Infantry without any modification.

The uniform of the fusiliers is composed of a serge cloak with an upright collar of white cloth, white metal buttons bearing an anchor with no cable, and the inscription, “Compagnie de discipline ;” no

lace. Two pairs of serge trousers, and two pairs of grey linen trousers. *Képi* of serge with chin strap, but with no other ornament; white cloth band for fusiliers, marone cloth for pioneers. Blue cloth frock with collar and facings of white cloth for fusiliers and of marone cloth for pioneers. The articles are similar in cut and make to those of the Marine Infantry. Sailors who are sent to the disciplinary company receive the same pay and wear the same uniform as marines.

Duties.—Men of the disciplinary company are exercised in drill and musketry, and are in addition employed in embarkation duties. They are only employed on works constructed at the expense of the State in case of necessity or as a reward for good conduct. They may be granted passes.

Arms.—Officers, non-commissioned officers, and buglers alone may be armed when off duty. Sergeants carry a sword-bayonet and revolver, but no rifle; corporals receive a revolver, which they carry when the men are armed. The fusiliers are only armed when at drill; off duty the arms are placed in an armoury in charge of a guard, and under the immediate supervision of the Captain. Pioneers are not armed at any time, they perform no military duty, and are employed without pay on works of public utility. They may only leave barracks for the purpose of proceeding to their work.

Labourers' Subdivision. Conditions of Work.—A subdivision, termed labourers, may be detached from the fusilier section of the disciplinary company stationed at Saintes for the purpose of being employed at Guadaloupe on works constructed at the expense of the State or of the Colony.

The labourers' subdivision is always commanded by an Officer of the company. It is composed of men who have served three months at Saintes without punishment, and in no case can the strength of the subdivision exceed a quarter of that of the company.

The rate of pay is arranged according to a fixed tariff, and never exceeds 40 c. a day.

The maximum number of working hours is eight, for four of which no pay is given.

Fusiliers of the disciplinary company receive no pay whatever for their work, unless they belong to the labourers' section, and cannot be employed in offices, or as orderlies, or in any situation except in the workshop of the subdivision. Men not belonging to the labourers' subdivision may be employed without pay, at Saintes, in keeping up the fortifications near their barracks and the roads leading to them; but in order that the men may be drilled at least once a day, the work may not last more than two hours in the morning or evening. These arrangements are somewhat modified at Martinique. At Fort de France (Fort Royal) on the west coast of the island, labourers and fusiliers are temporarily subjected to the same *régime*. Both subdivisions are employed at the dockyard during a maximum period of eight hours per diem, and they are equally entitled to a daily wage, which is, however, arranged according to two different tariffs, fusiliers receiving only half the pay given to men of the labourers'

subdivision. If a labourer is guilty of a single offence of drunkenness, or if his conduct is not exemplary, he is removed from the subdivision, and cannot be reinstated for six months. If he is removed a second time, he cannot be readmitted for a year, exclusive of any time he may pass in the pioneer section. If removed a third time, he cannot be reinstated. Every fusilier who has maintained his position in the labourers' section for three months is brought forward for drafting to one of the two garrisons of Guadaloupe or Martinique, or to one of the ships of the Atlantic division, according to the branch of the Service to which he belonged before being relegated to the disciplinary company. If he returns to the Marine Artillery or Infantry, his Colonial service only counts from the day of his admission or of his last re-admission to the labourers' subdivision. Should he belong to the garrison of the Antilles or Guiana, he reckons all service passed in the Colony except the period which may have elapsed between his being sent to the disciplinary company and his admission or re-admission to the labourers' subdivision. Every three months the disciplinary company, more particularly the labourers' subdivision, is inspected by the Officer Commanding the troops at Guadaloupe, who sees that all regulations are strictly carried out, and that men are drafted to their former corps as soon as they have qualified themselves for removal.

Certificates of Reformation.—Men of the disciplinary company who are not drafted to their former corps, because they are about to complete the period of their engagement, may obtain a "certificate of reformation." A similar certificate may be furnished to men who have rejoined their former corps, but have been transferred to the Reserve before completing the year of service which is necessary to entitle them to a certificate of good conduct. This certificate, certifying that they have shown a sincere desire to reform, and that they have kept clear of punishment while attached to the disciplinary company, is forwarded to their new corps, and if they have been well conducted is given to them at the time of their discharge, otherwise the certificate is returned to the Maritime Prefect at Rochefort who furnished it.

Colonial Disciplinary Corps.—The fusiliers of the disciplinary company are only ordinary defaulters who are temporarily separated from their comrades for the purpose of being subjected to a strict *régime*, essentially military in its character. The *disciplinaires des compagnies Coloniales*, on the other hand, are men who have been convicted or who have shown themselves to be extraordinarily incorrigible; they are therefore submitted to a particular discipline, less in the hope of reforming them (this is their last chance) than to isolate them from the rest of the Army, and to keep them under restraint during the period of service which they owe to the State. The Colonial disciplinary companies are composed of men consigned to them by sentence of Court-Martial or of men drawn from the African battalions or disciplinary corps who have shown themselves incorrigible, or who have been guilty of misconduct during detention. Soldiers can only be so transferred who have still at least eighteen

months to serve. The corps, of which the companies are employed according to the needs of the different Colonies, consists of a dépôt, two companies, and one section.

The dépôt is at Oléron, the first company at Senegal, the second at Madagascar, and the section at St. Pierre and Miquelon (south of Newfoundland). The Officers, non-commissioned officers, buglers, and men composing the armed portion of these Colonial disciplinary companies are furnished by the Marine Infantry. The soldiers composing the disciplinary portion of these companies are considered permanently under punishment. They are deprived as much as possible of communication of any kind with the other troops in the garrison, and with the inhabitants. They are employed on military and civil works, preferably on those fortifications and roads which are removed from the centres of population. The day's work is usually ten hours, labourers receive 25 c. and skilled workmen 30 c. per diem. A portion of the money thus earned is employed in keeping up the company, the remainder, about half, is put aside for the man himself, provided his conduct is good, but in case of misbehaviour the whole pay is devoted to the company. When sanctioned by the Commanding Officer, those men who have been at least three months in the Colony without punishment are permitted to work on their own account, the proportion of pay to be received by the man being decided by the Captain of the company. Soldiers who have been six months in the Colony free from punishment are allowed to wear a moustache, and may go out of barracks at stated times. When there is no work to be done, the military authority may arrange drill or occupation of some kind to keep the men employed. Specially well-conducted men of the disciplinary company may be employed as auxiliaries to the armed portion, but the number of these men must not exceed one-tenth of the strength. They receive an increase of pay of 5 c. per diem. They wear an anchor on the collar and wear a moustache.

Non-commissioned officers and Officers generally may inflict double the amount of punishment fixed by regulation for individuals of corresponding rank in the infantry. Company Commanders have the same powers of punishment as an Officer commanding a regiment, but corporal punishment of any kind is forbidden; violent men may, however, be put in irons. Punishment in a dark cell on bread and water may be inflicted for two days in the Colonies or for four days in France. Imprisonment up to fifteen days may be inflicted, and bread and water diet in addition may be ordered up to two days a week in the Colonies and three days a week in France.

When a detachment of twenty-five men of the disciplinary company is employed in camp, the first work undertaken is the construction of a prison.

Arms and Uniform, Permanent Staff.—Non-commissioned officers of the Colonial disciplinary companies do not carry a rifle, and their weapons consist, under all conditions of service, of a sword bayonet, and revolver of the pattern used in the Colonial police. With the above exception, the clothing, equipment, and arms of all

ranks of the armed portion are the same as worn in the Marine Infantry.

Arms and Uniform of Men under Punishment.—The men are only armed when at drill, which takes place when the Officer Commanding the troops deems necessary. The uniform and equipment are the same as in the ordinary disciplinary companies, except that the cloak is replaced by a hooded cape; in the Colonies the men, when at work, wear a blouse, linen trousers, and a straw hat.

Return of Men of Colonial Disciplinary Companies to France.—Men returning to France for any cause whatever cease to belong to their companies, and are borne on the strength of the dépôt company from the date of embarkation in the Colony. Men cannot obtain sick leave except under very exceptional circumstances, and when it is certified that the state of a man's health necessitates his return to France, he is transferred to the dépôt at Oléron. When a man who has completed his period of service arrives in France, he is immediately sent to his home; others are sent under police escort to Oléron. No man who has been discharged is provided with a warrant for Oléron unless he is a native of the island, or his family are residing there.

Remission of Punishment.—A remission of punishment may be accorded by the Minister to those men who have been recommended for this indulgence at the general inspection on account of their good conduct, or on account of some act of courage or devotion. The suggested remission must be so calculated that the man is not, as a consequence, better off, in the matter of time passed with the colours, than those young soldiers who have been posted to other branches of the Service.

Certificates of Reformation.—Men who, during the last six months of their service, have been of uniform good conduct may receive, in lieu of a certificate of good conduct, a document furnished by the Captain and *visé* by the Officer commanding the troops certifying that "this man has been of uniform good conduct during six months, he has been free of punishment, and has given proof of reformation." The document is given to the man at the moment of his departure. Men who receive these certificates may, if they wish, establish themselves in the Colony.

Men who have been sent to their homes and have still some service to render in the Reserve are placed on the list of Reserve men for the Army or Navy according to the branch to which they belonged at the time they were sent to the Disciplinary Company.

MEDICAL SERVICE.

The medical service in the Marine Infantry is undertaken by Officers of the Naval Medical Department of and below the rank of Principal Surgeon, and according to their rank they take the title and perform the functions of Surgeon and Assistant Surgeon. They wear the uniform and draw the pay of their rank in the Navy. They

are nominated at their own request or the first Officer on the roster of the required rank in the Medical Department is taken. They cannot be relieved at their own request unless they have served two years in the Marine Infantry and are in France at the time the request is made. The Colonial Medical Service is provided for similarly.

Principal Surgeons who carry out the duties of surgeons in the Marine Infantry in France, may, at their own request, be retained in this service for a second period of two years. The Colonial service of these Officers is performed according to a roster which is arranged as follows:—

1. Those who are in their first tour of service in their rank take rank among themselves according to seniority, the senior at the head of the list.
2. Those who have not commenced a first tour of service in their rank; these take rank among themselves according to date of promotion, the senior at the head of the list.
3. Those who have terminated one or several complete tours take rank among themselves in inverse order of seniority, the junior at the head of the list.
4. Those who, having completed one or several tours of service, have not commenced a fresh tour; these take rank among themselves according to date of their last disembarkation at a home port. Should two Officers disembark on the same day, the Officer who has completed the least amount of foreign service, either on board ship or in the Colonies, goes to the top of the roster.

Surgeons of the first class may be temporarily removed from the roster when there is a competition for the post of Professor at the Naval School of Medicine. If an Officer who has been temporarily removed from the roster on this account does not undergo the whole examination he is taken for foreign service out of his turn. Medical Officers of the same rank may exchange places on the roster, each taking the amount of foreign service credited to the other.

An Officer who has completed the regulation period in a Colony may obtain permission to remain a second period if the Officer of the same rank at the top of the roster consents to exchange. Requests to exchange must be forwarded to the Minister, through the proper channel, three months, at least, before the expiration of the period of Colonial service.

A medical Officer who, on account of an exchange, gives up his tour of Colonial service goes to the bottom of the list from the date of the authority granting the exchange.

NOTICES OF BOOKS.

Life of Christopher Columbus. By CLEMENT H. MARKHAM, C.B. London: Philip, 1892. Pp. 375. Size $7\frac{3}{4}'' \times 5\frac{1}{2}'' \times 1\frac{1}{4}''$. Weight under $1\frac{1}{2}$ lbs. Price 4s. 6d.

We have noticed, in a review of this book, Mr. Clement Markham taken severely to task for over-glorifying his hero. The charge may be well founded or not, but to the majority of readers this will be a very small matter. The estimate of the heroes of the past is, after all, much a matter of personal opinion, and when Mr. Clement Markham favours the world with a biography of any one of the world's explorers, we feel sure he has given it something deeply interesting and well worth perusal, as most certainly is this, his "Life of Christopher Columbus."

A History of the Fife Light Horse. By Colonel ANSTRUTHER THOMSON. Blackwood: Edinburgh and London, 1892. Pp. 283. Size $9\frac{1}{4}'' \times 7\frac{1}{4}'' \times 1''$. Weight under $2\frac{3}{4}$ lbs. Price 21s.

To the Mark Twain of thirteen centuries hence, "The Yankee at the Court of Queen Victoria," what a rich fund of illustration of one phase of our curious national life will this book present. A nation believing itself threatened by invasion, and each class of citizens coming forward in their own fashion, moved by one common impulse of patriotism to take its share, individually, in preparing to ward off the danger. No energetic pre-arranged line of action indicated by the rulers of the country and imposed by command upon it, but the nation settling for itself how its defence is to be carried out, and imposing it on the so-called Government. A party of gentlemen are, on an evening in 1860, assembled in the smoking room of a large country house, and one of them *happened* to read out from a newspaper a description of a uniform worn at a *levée* by a Peer, a territorial magnate. The uniform was one of a Mounted Volunteer Corps. And then a nobleman present, inspired by a spirit of emulation, says, "Why should we not have one in Fife?" and immediately the idea is taken up; the hunting field and market places are canvassed, and in a short time 111 men, chiefly representatives of the landed interest, landed proprietors and tenants, enrol themselves as members of a "Fife Mounted Rifle Volunteer Corps," and, ere long, the Corps enters as a unit into the armed strength of the Empire. Of the life of the Corps, now the Fife Light Horse, Colonel Anstruther Thomson has given a most readable account, which is not merely interesting to the Fife men, but is an excellent illustration of the determination and public spirit which animates the Volunteer Force.

Rulers of India. Albuquerque. By H. MORSE STEPHENS. Oxford: Clarendon Press, 1892. Pp. 222. Size $7\frac{1}{2}'' \times 5'' \times \frac{3}{4}''$. Weight under 1 lb. Price 2s. 6d.

It would, perhaps, have been more convenient had this volume appeared amongst the earlier issues of the "Rulers of India" series, as the contents relate to the efforts of Portugal and her celebrated Statesmen and Commanders in the 16th century to gain a permanent footing in the East, which, in a measure, prepared the way for the appearance of the English and Dutch in 1601.

The ablest Statesman that Portugal sent to India was, undoubtedly, Alfonso du Albuquerque, and a study of his policy and administration, so clearly explained in this excellent history, reminds us in many respects of the course followed in after times by our most successful Governors-General.

The book is an instructive and valuable addition to the series which is gradually educating the English public to a knowledge of the policy which has thus far enabled us to hold together the various elements which, united, form the Indian Empire,—M. G.

British New Guinea. By J. P. THOMSON, F.R.S.G.S., London: Philip, 1890. Pp. 336. Size 9" × 7" × 1½". Weight under 2 lbs. 6 ozs. Price 21s.

A very full and interesting account of one of the most recent additions to the Empire,

The Diplomatic Reminiscences of Lord Augustus Loftus, P.C., G.C.B., 1837-62. London: Cassell, 1892. First Series. 2 vols. Pp. 771. Size 9" × 6" × 2¾". Weight under 4¼ lbs. Price 32s.

Lord Augustus Loftus entered the Diplomatic Service in 1837, as Attaché to the Legation at Berlin. He was in 1844 transferred to Stuttgart, and in 1848 accompanied Sir Stratford Canning on his special mission to the Courts of Europe on his way to his post at Constantinople, became Secretary of Legation at Karlsruhe in 1853, and the same year returned to Berlin in the same capacity, and in 1858 was appointed Envoy Extraordinary to the Emperor of Austria; coming again to Berlin as Minister in 1861, whence he proceeded the following year to Munich as Minister. With this transfer the First Series of "Diplomatic Reminiscences" closes. Lord Augustus was, therefore, most favourably situated for seeing behind the scenes during a period which included the Revolution of 1848, the Crimean War, and that of 1859. To politicians his reminiscences must, therefore, be of much interest.

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VOL. XXXVI.

1892-93.

APPENDIX.

THE SIXTY-SECOND ANNIVERSARY MEETING of the Members was held in the Theatre of the Institution, on Saturday, March 4th, 1893, Admiral SIR GEORGE O. WILLES, G.C.B., Chairman of the Council, in the Chair.

- I. The Secretary read the notice convening the Meeting.
- II. The Sixty-Second Annual Report was read as follows:—
 1. The Council have much pleasure in submitting their Report for the year 1892.

MEMBERS.

2. In concluding their Report last year, the Council stated that, in their opinion, "if the question of a new building were once satisfactorily settled, there would be a larger accession of Members." This opinion has been verified to a certain extent, as One hundred and Seventy Life Members and Four hundred and Thirty-five Annual Subscribers, making a total of Six hundred and Five new Members, joined the Institution during the past year. The loss by death amounted to Eighty-one, and Fifty-five Members withdrew their names.

The names of Sixteen Annual Subscribers, whose subscriptions were in arrears for two years, have, in accordance with Section V par. 6, of the Bye-laws, been struck off the list of Members.

STATEMENT OF CHANGES AMONG THE MEMBERS SINCE 1ST JANUARY, 1892.

			Life.	Annual.	Total.
Members on the 1st January, 1892	..	..	1,531	2,673	4,204
„ joined during	„	..	170	435	605
			<hr/>	<hr/>	<hr/>
			1,701	3,108	4,809
Changed from Annual to Life..	..	..	+ 5	— 5	
			<hr/>	<hr/>	
			1,706	3,103	
			<hr/>	<hr/>	
		Life. Annual.			
Deduct—Deaths during 1892	..	27	54		
Withdrawals	..	..	55		
Struck off	..	..	16	27	152
			<hr/>	<hr/>	
			27	125	
			<hr/>	<hr/>	
Number on 1st January, 1893..	..	..	1,679	2,978	4,657

A tabular analysis of the present and past state of the Institution is given in Appendix A.

For detail of Annual Subscribers, see Appendix B.

FINANCE.

3. An abstract of the Accounts, duly audited, is given on next page.

ABSTRACT OF RECEIPTS AND PAYMENTS FOR THE YEAR ENDING
31ST DECEMBER, 1892.

RECEIPTS.				PAYMENTS.			
	£	s.	d.		£	s.	d.
Balance Cr. 1st Jan., 1892	243	7	11	Secretary's Salary ...	400	-	-
2,814 Members at £1	2,814	-	-	Librarian's " ...	240	-	-
166 " 10s.	83	-	-	Clerk's " ...	83	5	-
£6 Life Members, who pay 10s. to receive Journal ...	2	10	-	Asst. Clerk " ...	68	11	-
Honorary Members, who pay to receive Journal ...	10	-	-	Servants' Wages ...	1369	5	6
Payments in excess of £1 ...	8	3	6	Honourarium to Clerks ...	7	-	-
Arrears ...	3	-	-	Assistance in Office ...	15	10	-
Subscriptions for 1893	10	-	-	Servants' Clothing ...	68	13	-
Received from Agents, &c., paid in error ...	16	12	-	Insurance ...	20	5	-
Entrance Fees ...	605	-	-	Rent ...	200	7	3
Life Subscriptions ...	1,572	-	-	Rates ...	161	-	8
	5,124	5	6	Taxes ...	83	5	2
Dividends ...	615	12	2	Fuel ...	61	7	6
Sale of Journals ...	444	13	10	Lighting ...	41	11	3
Miscellaneous Receipts ...	4	2	5	Repairs to Building, Furniture, &c. ...	102	19	2
Received for Old Materials of Dover House Stables ...	77	13	6	House Expenses and Sundries ...	57	16	1
Government Grant ...	600	-	-	Museum ...	11	1	1
Interest on Money in "Deposit Account" ...	12	18	8	Library ...	118	5	3
Lending Library ...	51	10	-	Lending Library ...	24	16	5
"Temporary" Member, U.S.I. India ...	-	5	-	Printing Accessions to Library Catalogue for 1891... {	23	13	6
Sale of Library Catalogue ...	11	-	-	Journal. { Printing ...	1,116	6	2
Advertisements in Journal ...	45	-	-	Journal. { Shorthand Re- porters... ..	82	10	8
Donations ...	2,442	7	-	Journal. { Literary Services ...	187	10	-
				Journal. { Col. Hale, Hono- rarium... ..	18	18	-
				Journal. { Slips and Short Copies of Lec- tures	71	13	6
				Journal. { Wall Diagrams... ..	24	4	10
					1,501	3	2
				Lecture Expenses ...	37	15	10
				Advertisements ...	168	17	4
				Appeals to the Services, &c. ...	363	4	3
				Postage { Letters ...	44	10	7
				Postage { Journals ...	360	13	10
					405	4	5
				Stationery and Sundry Printing	226	10	9
				Gold Medal ...	11	10	-
				Reporting Council Meetings ...	15	12	-
				Telegraphic Address ...	1	1	-
				Legal Expenses ...	1	1	-
				Banqueting House, Whitehall (maintenance) ...	24	15	6
				New Building ...	518	16	5
				Cash repaid to Agents ...	16	12	-
				Charges from Agents ...	-	13	2
				For £308 9s. 2d. Nottingham Cor- poration 3 per Cent. Stock at 97 $\frac{1}{8}$...	300	-	-
				For £1,528 12s. 8d. Nottingham Cor- poration 3 per Cent. Stock at 98 ...	1,500	-	-
				For £1,025 12s. 4d. India 3 per Cent. Stock at 97 $\frac{3}{8}$...	1,000	-	-
				Total Payments ...	8,260	19	8
				Balance { Deposit, Commis- sioner of Woods ...	500	-	-
				Balance { Deposit, Book- sellers ...	2	6	2
				Balance { Cash in Bank ...	892	3	2
				Balance { Balance Credit, Petty Cash ...	17	7	-
					1,411	16	4
					£9,672	16	-

BALANCE SHEET, 31ST DECEMBER, 1892.

PROCEEDINGS OF THE SIXTY-SECOND ANNIVERSARY MEETING.

iii

LIABILITIES.

	£	s.	d.	£	s.	d.
Harrison & Sons—						
Journals, &c. (Printing)	...	127	16	...		
Postage, Dec. No. of Journal	...	33	19	6		
Gas Light & Coke Co., Dec. qr. ...	...	...	...	161	15	6
Warrington & Co., Stationery, &c., Dec. qr.	...	...	...	16	17	6
Wilson & Son, House Expenses ...	...	...	...	12	12	1
N. J. Crew. Repairs to Building, &c. ...	...	...	...	-	12	2
Steel & Jones. Papers and Periodicals ...	...	...	...	12	1	6
Dulan & Co. Foreign Books ...	...	...	...	9	18	9
Messrs. Fladgates, Solicitors ...	...	...	...	2	2	8
Banqueting House, Whitehall, (Maintenance), about	...	...	...	26	10	-
Ground Rent of Site, New Building, Dec. qr. ...	...	...	...	50	-	-
Clerk of Works, Salary, Dec. ...	...	...	...	87	10	-
Advertisements, about ...	...	...	...	12	15	-
10 Annual Subscriptions received in advance	...	...	...	28	-	-
	...	...	...	10	-	-
Total Liabilities, 31st Dec., 1892...	...	...	...	430	15	2

Balance in favour of the Institution

...	...	26,042	4	1
...	...	£26,472	19	3

ASSETS.

Cash Balances, as per Abstract...	...	...	...	...	...	...
£16,655 1s. 11d. Consols	2½ per Cent. at	93, value ..	...	...	...	...
2,028 17s. 8d. India	3½ "	108½ "	...	...	...	...
3,044 17s. 11d. "	3 "	93 "	...	...	...	...
3,076 5s. 3d. Notts. Corp. 3	" "	100 "	...	...	...	...
Arrears of Subscriptions recoverable	...	...	...	...	...	...
Due from Admiralty for Journals, Dec. qr.	...	...	...	...	...	...
Donations promised	...	...	...	...	...	...

Property (Estimated Value of)—	...	...	...	...	...	...
Books, Pictures, &c., in Library	...	...	...	...	...	...
Museum	...	...	...	...	...	...
Journals, Catalogues, &c., in stock	...	...	...	...	...	...
Lithographs, New Building...	...	...	...	...	...	...

Examined 30th January, 1893.

E. R. WETHERED,
ALLAN H. DRUMMOND, } Auditors.
ERNEST R. RAITT

JOHN DAY,
Accountant.

PROCEEDINGS OF THE SIXTY-SECOND ANNIVERSARY MEETING.

ESTIMATE OF RECEIPTS AND EXPENDITURE FOR THE YEAR 1893.

RECEIPTS.				EXPENDITURE.			
	£	s.	d.		£	s.	d.
Cash Balances	1,411	-	-	Secretary's Salary	400	-	-
Annual Subscriptions:				Editor and Librarian's Do.	300	-	-
£ s. d.				Capt. Burgess' Salary, March	33	-	-
At £1 .. 3,080	-	-		" " Pension (9			
,, 10s. .. 80	-	-		months)	180	-	-
	3,160	-	-	Col Day's Salary, 1893 ..	250	-	-
Entrance Fees	400	-	-	Clerk's Salary	88	-	-
Life Subscriptions ..	1,200	-	-	Assist. Clerk's Do... ..	68	-	-
Dividends	590	-	-	Servants' Wages	369	-	-
Sale of Journals	275	-	-	" Clothing	68	-	-
Government Grant ..	600	-	-	Insurance	40	-	-
Lending Library	40	-	-	Rent, Present Building ..	200	-	-
Advertisements in Journal	45	-	-	Ground Rent, New Building,			
				Oct., 1892—Dec., 1893..	495	-	-
Total Estimated Receipts	7,721	-	-	Rates	310	-	-
				Taxes	83	-	-
				Fuel	70	-	-
				Lighting	50	-	-
				Repairs to Building, &c. ..	100	-	-
				House Expenses	60	-	-
Balance*	7,367	-	-	Museum	20	-	-
				Library	130	-	-
				Lending Library	30	-	-
				Printing Accessions to Li-			
				brary Catalogue, 1892 ..	12	-	-
				Journal	1,500	-	-
				Advertisements	170	-	-
				Postage { Journal .. £360			
				Letters .. 40			
					400	-	-
				Printing and Stationery ..	170	-	-
				Gold Medal.. ..	12	-	-
				Banqueting House Main-			
				tenance	70	-	-
				New Building and Banquet-			
				ing House	9,410	-	-
				Total Estimated Ex-			
				penditure	£15,088	-	-
	£15,088	-	-				

* To be realised from capital unless met by donations and increased subscriptions.

LIFE SUBSCRIPTIONS AND CAPITAL ACCOUNT.

5. Life Subscriptions to the amount of £800 have been invested in Nottingham Corporation 3 per Cent. Stock, and £600 in India 3 per Cent. Stock. In addition, £1,000 of "Income" have also been invested in Nottingham Corporation 3 per Cent. Stock, and £400 in India 3 per Cent. Stock. These sums represent £2,862 14s. 2d. of Stock. The invested property of the Institution is thus raised to £24,805 2s. 9d. (see Appendix C.), of which £18,152 0s. 6d. of Stock is the accumulation of Life Subscriptions, and £6,653 2s. 3d. of Stock is the accumulation of investments of surplus revenue.

6. That since the expenditure of the Institution, and therefore the responsibility of the Council, has very much increased, they think it desirable for the security and satisfaction of the Governing Body of the Institution, that the accounts be duly audited by Chartered Accountants.

BUILDING FOR THE INSTITUTION.

7. By an unanimous vote passed at a Special General Meeting, held on the 27th June last, H.R.H. the Duke of Cambridge, President, in the chair, the Members agreed to adopt what was termed the "Whitehall Scheme" for housing the Institution, at an estimated cost of £22,000. The site of the Dover House stables, which have been removed, has been secured, and satisfactory progress has been made with the new building. The adaptation of the Banqueting House for the Museum has been commenced.

The contracts have been executed, and the Contractors have undertaken to make the Banqueting Hall ready for occupation by the first week in May, and to complete the new buildings by June, 1894, at a total expense of £21,971.

To meet the heavy outlay, the Council have appealed to the Members, to the Naval and Military Services, and to the public, with the result described in the Report of a Special Committee, Appendix D. The subscription list was graciously headed by Her Majesty the Queen, and by T.R. Highnesses the Prince of Wales, the Dukes of Edinburgh and Connaught, and H.R.H. the President.

CHANGES IN THE STAFF OF THE INSTITUTION.

Secretary and Curator.

8. In accordance with the recommendation of a Special Committee, appointed to draw up a scheme for carrying into effect the recommendations of the Committee of 1891, with regard to the re-distribution of the duties of the Executive Staff of the Institution, Captain Boughey Burgess will be retired from the 4th March, 1893, on account of age; and in consideration of his long, faithful, and valuable services, extending over a period of nearly 36 years, the Council have unanimously voted him a pension of £240 per annum. Lieut. Gerald Maltby, R.N. (retired), has been appointed his successor, at a salary of £400 a-year, the appointment to be for five years, but subject to termination at three months' notice on either side. The Council feel that, in Lieut. Maltby, the Institution has secured the services of a valuable officer.

Assistant Secretary, Accountant and Librarian.

Lt.-Colonel John Day, retired R.A., who has carried on the above duties zealously, and to the entire satisfaction of the Council for 10 years, did not compete for the Secretaryship; but the Council, in order that the new Secretary may have the benefit of his assistance and advice, particularly in the monetary affairs of the Institution at this juncture, have invited him to give his services at his present salary till the end of 1893, when he will retire with a gratuity to be determined by the Council.

Editor and Librarian.

Colonel Lonsdale Hale, having resigned his Honorary Editorship of the Foreign Section of the Journal, which he had carried on much to the satisfaction of the Members and of the Council for 16 years, the Council considered it a convenient opportunity to carry out the new arrangements with regard to the duties of Editor and Librarian, in accordance with paragraph 7 of the Annual Report for 1891, and decided that the entire editorial work of the Journal and the superintendence of the library shall be in the same hands. They have appointed Colonel C. W. Bowdler, late 8th Hussars, and many years in the Intelligence Department of the War Office, Editor and Librarian, and they consider that the Institution may be congratulated in having these very important duties committed to his able direction.

PAPERS.

9. Papers on the following subjects were read and discussed during the year, and have appeared in the Journal, viz.:—

- EDWARD A. CAZALET, Esq., on "The Russian Language and Literature."
 REAR-ADMIRAL SAMUEL LONG. "An attempt to estimate the probable effect of the introduction of Quick-firing Guns on Naval Tactics and Construction."
 LIEUTENANT H. B. JONES, R.E., on "Military Ballooning."
 VICE-ADMIRAL SIR EDMUND R. FREMANTLE, K.C.B., C.M.G., on "The Training of our Seamen."
 MAJOR C. F. C. BERESFORD, R.E., on "The Telephone at Home and in the Field."
 COLONEL J. R. ROTHWELL, h.p., R.A., Professor of Staff Duties, Military Administration and Law, Staff College, on "The Reconnaissance of a Railway; its Utilization and Destruction in time of War."
 LIEUTENANT F. J. DAVIES, p.s.c., Grenadier Guards, on "The employment of Photography in Reconnaissance."
 W. B. TEGETEMEIER, Esq., on "Pigeons for Land and Sea Service, with examples from recent Experiments."
 ROBERT H. SCOTT, Esq., M.A., F.R.S., Meteorological Office, on "Atlantic Weather and its connection with British Weather."
 COLONEL T. B. SHAW-HELLIER, Commandant Royal Military School of Music, Kneller Hall, on "The Organization of Military Bands, and on Military Music."
 LIEUTENANT-COLONEL N. L. WALFORD, h.p., R.A., on "Field Howitzers and Mortars."
 CAPTAIN SIR ALFRED JEPHSON, R.N., Hon. Secretary late R.N. Exhibition, on "The Royal Naval Exhibition of 1891."
 MAJOR L. EDYE, R.M.L.I., Hon. Secretary, Arts-Section, R.N. Exhibition, on "The Arts Section of the Royal Naval Exhibition."
 COLONEL J. F. MAURICE, C.B., late Professor of Military Art and History, Staff College, on "Military Geography."
 LIEUTENANT F. T. HAMILTON, R.N., on "The application of Electricity to Torpedo and other Naval purposes."
 COLONEL F. J. GRAVES, h.p., late 20th Hussars, on "Military Education."
 W. LAIRD CLOWES, Esq., Gold Medallist, Naval Institute, U.S.A., on "The Place and Use of Torpedo Boats in War."
 CAPTAIN J. D. FULLERTON, R.E., on "Modern Aerial Navigation."

DISCUSSION on the subject of the Naval Prize Essays, viz.:—"Maritime supremacy being essential for the general protection of the British Empire and its Commerce, to what extent, if any, should our Naval Force be supplemented by fixed defences at home and abroad, and to whom should they be confided?"

MAJOR E. SATTERTHWAIT, 2nd Vol. Batt. The Queen's Own West Kent Regiment, on "The late War Game in the Open."

CAPTAIN WALTER H. JAMES, F.R.G.S., on "Magazine Rifles, their latest Development and Effects."

JOHN FURLEY, Esq., on "Ambulance Work and Material in Peace and War."

MAJOR G. F. R. HENDERSON, York and Lancaster Regiment, Professor of Tactics, Military Art and History, Staff College, on "The Recent French Manœuvres."

CAPTAIN S. M. EARDLEY WILMOT, R.N., on "The Dimensions of Modern War Ships."

COLONEL THE HON. H. G. L. CRICHTON, Commanding Hampshire Yeomanry, on "Saddles."

R. BRUDENELL CARTER, Esq., on "Colour Blindness."

CAPTAIN G. S. MACILWAINE, R.N., on "Ventilation of Ships."

The theatre has been lent to the Home District Tactical and War Game Society, and to the Metropolitan Volunteer Serjeants' Tactical Society for their lectures, to the National Rifle Association, and to several other Societies connected with the Services for their meetings.

THE JOURNAL.

10. The editing of the Journal, as mentioned in a preceding paragraph, has now come into the hands of Colonel Bowdler, who proposes to devote an additional space to notices of Naval and Military Books published abroad, to original papers, and to extracts from some of the principal Foreign Journals. A more extended knowledge of foreign professional literature will thus be made available to the Members. In the Naval part of the work he will be assisted by the advice of several well qualified Naval Officers.

LIBRARY.

11. The Library now contains 24,099 volumes, of which two hundred and fifty-four have been added since the last Report; of these, one hundred have been purchased, ninety-nine presented, and the remainder are bound periodicals, &c.

Donations of books and maps have been received from the Governments of Austria, Brazil, Denmark, France, Germany, Italy, the Netherlands, Russia, Spain, Sweden, Switzerland, and the United States.

The thanks of the Council have been conveyed to the several Governments for these donations.

The Institution is indebted to the Lords Commissioners of the Admiralty, to the Secretaries of State for War, and for India, for copies of various works issued by their Departments, and to the Speaker of the House of Commons for Parliamentary Papers.

The exchange of Journals with Foreign Governments, and with many Scientific Societies in this and other countries, has been continued.

The accessions to the Library to the 31st December, 1892, will be shortly published in the same form as the new Catalogue, and, in future, these accessions will be issued yearly.

The new Catalogue is found to be of great utility; it is on sale to members, price 10s.; Accession Catalogue, 1s.

The Lending Library still continues a success. The numbers who have subscribed since its formation are as follows:—1887, 19;

1888, 58; 1889, 60; 1890, 79; 1891, 71; and 1892, 93. The fund, after paying all charges against it, shows a balance Cr. of £89 16s. 9d. The subscription for twelve months is ten shillings.

VICE-PATRON.

12. Admiral Sir Frederick W. E. Nicolson, Bart., C.B., having resigned his seat as Vice-President and ex-officio Member of Council, the Council have had the pleasure of electing him a Vice-Patron of the Institution.

VICE-PRESIDENT.

13. The Council regret to record the death of Colonel Henry Hume, C.B., late Grenadier Guards. Colonel Hume became a Member of the Institution in 1860, was elected a Member of Council in 1866, and a Vice-President in 1880.

GOLD MEDAL.

14. Fifteen Essays (one received too late) were submitted for competition, the subject being:—

“The Military Organization best adapted to Imperial Needs.”

General Sir George T. Chesney, K.C.B., C.S.I., C.I.E., R.E., M.P., Lt.-General E. F. Chapman, C.B., R.A., and Lt.-Colonel N. L. Walford, R.A., kindly undertook the duties of Referees, and their decision will be made known to the Meeting.

15. SUBJECT FOR THE NAVAL ESSAY FOR THIS YEAR.

“The tactics best adapted for developing the power of existing Ships and Weapons (Gun, Ram, and Torpedo) which should regulate Fleets, Groups, or Single Vessels in Action.”

The competition is open to all Members and to all who are eligible to become Members.

MEMBERS OF COUNCIL.

16. The following Members retire, having served three years on the Council:—

NAVAL.

Vice-Admiral P. H. COLOMB.
Admiral Sir W. HOUSTON STEWART,
G.C.B.

MILITARY.

Lieutenant-General E. H. CRIVE,
Governor and Commandant Royal
Military College.
Major-General R. N. DAWSON-SCOTT,
Commandant School of Military
Engineering, Chatham.
Lieutenant-Colonel N. L. WALFORD,
h.p., R.A.

And, further, Rear-Admiral Bowden-Smith has proceeded on Foreign Service, and Dr. Fleming, C.B., has resigned. The vacancies thus caused will, as far as the Military Officers are concerned, be filled by ballot at the Annual Meeting in the way prescribed by the Bye-laws, but the case of the Naval vacancies must be dealt with dif-

ferently, inasmuch as, on 'closing' the book of nominations for election to the Council, it was found that no names of Naval Officers had been entered, and that therefore the Bye-law could not be complied with. It being necessary that vacancies amongst the Naval Members should not on that account remain unfilled, a resolution will be proposed to meet that difficulty.

CONCLUSION.

In conclusion, the Council congratulate the members upon the prospect which there now is of the Institution being soon suitably accommodated in new premises, of which the Banqueting House is of great historic interest. At the same time they think that it should be borne in mind that the extensive building operations, which have for this purpose been commenced, cannot be completed without the expenditure of a large sum. If this has to be provided out of the capital of the Institution, a serious loss to the annual income will ensue, and the future sphere of its usefulness will be gravely imperilled. The Council therefore hope that all friends of the Institution, seeing that they are on the eve of fulfilment of what for years past they have been labouring to accomplish, will spare no pains in endeavouring to obtain a more favourable response to the appeal lately made for contributions to the Building Fund than has been hitherto accorded to it. They would also impress upon the Naval and Military Services that the success of the Institution in years to come is dependent upon a considerable increase to the existing number of its Members.

WHITEHALL YARD,
21st February, 1893.

By Order,
B. BURGESS, CAPTAIN,
Secretary.

APPENDIX A.

TABULAR ANALYSIS OF THE STATE OF THE INSTITUTION.

Year. 1st Jan. to 31st Dec.	Annual Subs. received.	En- trance Fees.	Receipts (from all sources).	Life Subs. received.	Amount of Stock.	Invested in the pur- chase of Books, &c.	No. of Vols. in Library.	No. of Members on the 31st Dec.	Number of Visitors
	£	£	£	£	£	£			
1831	654	..	654	1,194	..	..	..	1,437	..
1832	1,146	..	1,146	973	..	..	..	2,699	..
1833	1,405	..	1,450	692	..	..	..	3,341	..
1834	1,500	..	1,549	583	1,100	..	..	3,748	13,376
1835	1,480	..	1,574	366	2,430	40	..	4,155	8,537
1836	1,570	..	1,682	330	3,747	45	..	4,069	8,521
1837	1,549	..	1,747	222	4,747	180	..	4,164	10,907
1838	1,462	..	1,634	230	5,500	246	..	4,175	15,788
1839	1,399	..	1,565	168	5,500	292	..	4,186	16,248
1840	1,363	..	1,525	198	5,500	446	5,500	4,257	17,120
1841	1,450	..	1,643	186	6,000	243	5,850	4,243	19,421
1842	1,373	..	1,565	144	6,400	373	6,450	4,127	21,552
1843	1,299	..	1,494	140	6,700	237	7,000	4,078	27,056
1844	1,274	..	1,408	112	3,000	298	7,850	3,968	22,767
1845	1,313	..	1,466	228	1,500	127	8,100	3,988	21,627
1846	1,298	..	1,456	138	1,500	74	8,410	4,031	32,885
1847	1,314	74	1,502	132	1,700	37	..	4,017	38,699
1848	1,175	57	1,375	48	1,700	85	9,641	3,947	37,140
1849	1,176	72	1,375	84	1,150	58	..	3,970	33,333
1850	1,141	106	1,294	198	600	36	..	3,998	33,773
1851	1,136	131	1,292	66	666	34	10,150	3,188	52,173
1852	1,134	133	1,281	114	200	43	10,300	3,078	20,609
1853	1,243	319	1,684	264	528	41	10,420	3,251	25,952
1854	1,200	138	1,368	126	612	95	10,587	3,171	22,661
1855	1,159	107	1,289	120	653	55	10,780	3,131	14,778
1856	1,216	197	1,519	156	761	47	10,832	3,204	16,184
1857	1,258	176	1,937	78	1,038	40	10,960	3,168	12,755
1858	1,318	221	2,102	105	438	31	11,062	3,246	25,747
1859	1,526	195	2,277	512	946	70	11,320	3,344	28,739
1860	1,961	298	3,577	397	2,178	114	11,517	3,518	28,011
1861	2,122	305	2,899	266	2,846	99	11,812	3,689	23,296
1862	2,296	242	3,127	239	3,178	109	12,026	3,797	27,215

APPENDIX A—(continued).

TABULAR ANALYSIS, &c.

Year. 1st Jan. to 31st Dec.	Annual Subs. received.	En- trance Fecs.	Receipts (from all sources).	Life Subs. received.	Amount of Stock.	Invested in the pur- chase of Books, &c.	No. of Vols. in Library.	No. of Members on the 31st Dec.	Number of Visitors.
	£	£	£	£	£	£			
1863	2,379	218	3,100	405	3,583	143	12,296	3,847	18,150
1864	2,425	215	3,253	222	4,516	116	12,700	3,902	17,276
1865	2,435	154	3,467	235	4,804	137	13,000	3,895	18,253
1866	2,435	157	3,488	299	5,486	150	13,337	3,891	17,067
1867	2,431	141	3,467	208	5,732	140	13,800	3,823	17,211
1868	2,446	184	3,534	297	6,396	119	14,100	3,812	16,417
1869	2,368	165	3,485	238	6,653	232	14,660	3,792	15,947
1870	2,376	178	3,493	333	7,313	140	15,055	3,831	18,654
1871	2,455	237	3,677	538	7,748	202	15,501	3,922	19,420
1872	2,620	336	4,111	713	8,927	192	15,761	4,116	19,773
1873	2,776	295	4,316	535	9,465	222	16,227	4,276	18,183
1874	2,819	216	4,491	409	10,189	218	16,624	4,330	16,771
1875	2,801	154	4,595*	469	10,721	228	17,000	4,308	15,960
1876	2,794	162	4,500	437	11,305	171	17,700	4,320	15,543
1877	2,840	218	4,750	526	11,725	217	18,300	4,405	15,682
1878	2,881	231	4,700	459	12,091	231	18,750	4,485	17,881
1879	2,904	180	4,490	407	12,505	254	19,170	4,473	15,529
1880	2,962	255	5,115*	577	12,965	240	19,565	4,531	13,041
1881	2,893	238	4,967	645	13,670	240	19,920	4,577	12,507
1882	2,829	181	4,739	491	14,069	174	20,352	4,591	12,546
1883	2,892	205	5,023	692	15,251	157	20,658	4,027	11,482
1884	2,851	172	4,950	491	16,000	207	20,943	4,613	12,388
1885	2,857	181	5,121	545	16,902	169	21,370	4,377	12,220
1886	2,757	141	4,842	358	17,492	192	21,778	4,368	12,358
1887	2,728	141	4,898	401	18,372	160	22,087	4,280	10,974
1888	2,716	216	5,238*	512	19,705	195	22,565	4,257	14,848
1889	2,663	148	4,874	357	20,498	140	23,046	4,226	13,333
1890	2,661	154	4,875	371	21,217	163	23,513	4,200	15,019
1891	2,640	189	5,004	454	21,942	153	23,845	4,204	13,892
1892	2,930	605	9,429	1,572	24,805	142	24,099	4,657	14,875

* A legacy of £100 was received this year.

APPENDIX B.

DETAIL OF ANNUAL SUBSCRIBERS.

1892.

Paid for 1892 @ £1	2,814
" " " " 10s.....	166
" in 1891 for 1892	13
New Members who joined between October and December, 1891	40
Commutated to "Life," who did not pay subscription for 1892	3
Deaths and withdrawals, subscriptions unpaid for 1892	35
Members two years in arrears	16
Do. in arrears for 1892	21
	<hr/>
	3,108
Deduct, Annual to Life.....	5
	<hr/>
	3,103
{ Deaths..... 54 }	109
{ Withdrawals 55 }	
	<hr/>
	2,994
Struck off for non-payment	16
	<hr/>
	<u>2,978</u>

E. R. WETHERED, Lt.-Col.,
ALLAN H. DRUMMOND,
ERNEST R. RAITT, } Auditors.

JOHN DAY,
Accountant.

APPENDIX C.

CAPITAL ACCOUNT.

Stock.			31ST DECEMBER, 1892.	Present Value.		
£	s.	d.		£	s.	d.
16,655	1	11	Consols $2\frac{3}{4}\%$, at 98	16,321	19	11
2,028	17	8	India $3\frac{1}{2}\%$, at $108\frac{1}{2}$	2,201	6	9
3,044	17	11	India 3% , at 98	2,984	0	0
3,076	5	3	Nottingham Corpn. 3% , at 100	3,076	5	3
				<hr/>		
<u>24,805</u>	<u>2</u>	<u>9</u>		<u>24,583</u>	<u>11</u>	<u>11</u>

APPENDIX D.

REPORT of the Special Committee appointed at the Meeting of the Council, on the 10th January, 1893, "To consider and report on the various measures to be taken for increasing the Funds of the Institution."

The Committee consisted of—

Members of the Council:—

Admiral Sir G. Willes (Chairman),
Lt.-Gen. W. Goodenough, C.B.,
Col. Lonsdale Hale,
Col. Slade;

Members of the Institution but not of the Council:—

Sir George Chubb,
Captain Sir A. Jephson, R.N.,

and met on the 16th, and also on the 20th January.

The Committee having enquired into the working of the methods already adopted for increasing the funds of the Institution, and also into the practicability and probable value of the methods proposed but not yet adopted, report as follows:—

Methods already Adopted.

(a) Appeal by printed circular to every individual officer in the Services, whether a member or a non-member, eligible for membership.

The number of officers thus applied to was about 37,000; the result has been, from 1st September to 19th instant, an addition of 147 Life Members (34 Naval and 113 Military); and 374 Annual Subscribers (32 Naval and 342 Military); the Life Subscription yielding £1,323 in addition to £147 Entrance Fees; the Annual Subscriptions giving £374 annual income, and £374 Entrance Fees.

The cost of this Appeal was £368 4s. 3d.; this includes £166 15s. given below.

The Committee regard the result as very unsatisfactory; and it shows that there must be many ships and many military units in which the officers give hardly any support to the Institution.

It is recommended that a personal canvass of these officers be adopted after the Annual Meeting, this being effected by inviting selected officers in each ship and military unit to act as "Corresponding Members," and to beat up members, and also to work generally in the interests of the Institution.

(b) An Appeal to the General Public, as well as to the Services, by advertisements in the Press.

The cost of this was £166 15s. 0d., and the amount of Donations, up to 19th January, is £2,913 3s. 6d.

The General Public responded hardly at all to the Appeal.

It is recommended that an officer be specially selected to visit the principal manufacturers of Service matériel, and other civilians interested in the welfare of the Institution, to place before these gentlemen the need of assistance, and to endeavour to obtain it from them.

It is recommended that no general appeal by advertisement should be made again, until this method has been tried.

(c) Promises of donations, provided a specified number of individuals subscribe a like amount each.

Rear-Admiral Bowden Smith's offer of £50 has produced six promises; but Lt.-Col. Alt's offer of £5, under these conditions, has at present not produced much result. Both, however, remain open.

Methods Proposed but not yet Adopted.

(1) A Naval and Military Exhibition, in 1894, to be held in aid of the Funds of the Institution.

The Committee consider this method not feasible, and recommend that it be not adopted.

(2) A radical change in the terms of Membership of the Institution, proposed by Lt.-Col. Hennell, D.S.O.

The Committee are of opinion that it is not within their province to consider changes of the character advocated by Lt.-Col. Hennell.

(3) The admission of Volunteer Corps to certain limited rights of Membership on payment of annual subscriptions in the form of Corps Subscriptions.

The Institution is indebted to the Major-General Commanding the Home District, Lord Methuen, C.B., and also to the Home Counties Volunteer Forces Institution, for having taken up this matter with the view of obtaining support from the Volunteer Force generally.

Lord Methuen was good enough to attend the Meeting of the Committee, on the 16th January, and to give information on the subject.

Up to the present time the idea has been received apparently with little favor by the 350 corps who were communicated with on the subject; and as there is a good deal to be said against this method, although there are many arguments which may be urged in its favor, the Committee recommend the postponement of the consideration of this method until the feeling of the Volunteer Corps as a body has been ascertained.

(4) A Fancy Bazaar to be held in the Banqueting Hall, under Royal Patronage, during the latter part of May or in the first weeks in June, 1893, on the occasion of laying the Foundation or Memorial Stone of the New Buildings.

Captain Malton and Captain Holden, both Members of the Institution, laid their views on this method before the Committee.

The Committee recommend its adoption, and that an Executive Committee should be at once appointed to carry the proposal into effect. Further, that H.R.H. the Prince of Wales be at once approached with a view to H.R.H. honouring the Institution by laying the Foundation Stone. The Committee also suggest that H.R.H. the Princess of Wales might be respectfully solicited to open the Bazaar. The

Executive Committee should be composed of some members of the Council, and the two officers already named, with full power to add to their number Members of the Institution who, like those officers, will kindly give their services for the purpose.

The Committee are of opinion that if the Council adopt this method, the Executive Committee should be at once formed, and the scheme taken in hand forthwith.

The Committee suggest that it would be desirable to give, in the next Annual Report, the substance of their Report.

Signed on behalf of the Committee,

GEORGE WILLES,
Chairman.

The CHAIRMAN:—

I have in the first place to state that the Duke of Cambridge, our Royal President, desired me to express his regret at not being able to attend to-day. By the new Rules of the Institution, failing the President, I must be the Chairman. You cannot be more sorry than I am myself. The Report is really so ample that there is very little that need be said, but I must call your attention to paragraph 6, because it refers to the policy of the last Annual Meeting. It was proposed by the Select Committee of the Council that we should have a chartered accountant. This did not find favour with the Members present last year, and particularly the Duke of Cambridge; nevertheless, the Council have thought it well over, and have determined again to recommend you to appoint a chartered accountant. It is the custom of the day. I believe all large firms, even banks, employ chartered accountants to draw up their accounts. There is no doubt that our financial position is very different to what it was. Formerly it was for the information of the Members, but now, when we beg, it is very desirable that our accounts should be placed in a different form. Our venerable Prime Minister has said that if you want to beg, you must have "a good cause and a bad exchequer." I believe he is right. Colonel Young has taken a great deal of interest, and has written to the Council recommending a change of practice. That could not take place this year, but I feel myself authorised to say that, during the next year, the suggestion of Colonel Young will meet with consideration, so that, when we go round with the hat in 1894, our accounts may be placed in a position which will be more favourable for our cause. The Royal Duke, who does not generally take a gloomy view of affairs, rather did so last year, and he said "Until we receive an answer from the Government, it is useless for us to complain that nothing has been done. As soon as the Government will make up their minds it will, of course, be the duty of the Council, and those who act for this Institution, to act with promptitude and with decision." That was this day year. Well, gentlemen, on the 25th of May, we received at last an answer from the Chancellor of the Exchequer. On the 31st of May we called a General Meeting, which was held on the 27th of June, when it was unanimously agreed that we should make a bold venture and take the chapel and the stable site. The deeds were signed on the 4th of October, the contract for the foundations on November 5th, and we accepted tenders for the building and alteration of the chapel on February 14th, 1893. Well, I rather think, when you read those dates, that the promise of the Duke has been acted up to, and that the Council, although they are considered rather antiquated gentlemen, have really acted with vigour. I am obliged to praise ourselves a little. Of course, as the Report says, we now bid fair to get rid of this miserable place, and to have a building and Institution worthy of the country. The only dark spot, the only cloud, is the question of £ s. d. No doubt people have not come forward to subscribe, although our Subscription List is headed by several members of the Royal Family; nearly the whole of the money

has been subscribed by Naval and Military Officers, who are well known not to have very deep pockets, but I still hope that when they see we mean business, the money will come. But what we chiefly want is more Subscribers; not Life Members, but Annual Subscriptions. I do not think we have done badly in getting six hundred, but we must, at least, have six hundred more. I cannot sit down, and I am sure you would be sorry if I did sit down, without alluding to the cessation of duties, this very day, of our worthy Secretary (loud cheers). His name has become quite a household word. 35 years—what a time! Our good friend does not like going, and does not wish to retire, but he has reached an age far beyond that allowed to our favoured brother officers, the Generals. A worthy friend of mine opposite has said in this theatre that people should never be retired compulsorily, and that it should be left to their discretion. I have in my mind some strong instances to prove that if it is left to ourselves to determine, we should not resign at all. Now, it may be said, but I hope it will not be, “Why, when you are so hard up for money, should you give a pension of £240 to our Secretary?” Gentlemen, the Council consider it is a debt of honour (cheers). Having made the decision that he is to leave us, I am glad to see by those cheers that there will be no question as to the way Captain Burgess is to be treated (cheers). Colonel Day has not been such an old friend and servant of the Institution, but he has served us well for ten years (cheers). It is not quite the fault of the Council that he is going, because he might have become a candidate for the Secretaryship, and I believe that if he had been put forward by the Committee of Selection, the military Members, who have the majority and have the power of selection, would not have passed over Colonel Day (cheers). I am sure you will all join with me in wishing our worthy Secretary and Colonel Day, when he retires, happiness and health for the remainder of their lives (cheers).

Captain BURGESS:—

I should like to take this opportunity, Sir George Willes, to express my great thanks to the Council and to the Members for the kind words in which I have been referred to and which they have accepted. I have made a great many kind friends here, and I leave, I may say, with the greatest regret. At the same time, the time must come when a man must leave. I am very glad indeed to have been spared so long, and to see that the Institution is likely to be housed in handsome and good quarters, and I hope that that will be accomplished before long. I can only repeat I have made a great many kind friends whilst I have been here, and I never shall forget the kindness which I have always received from the Council, and from the Members of this Institution.

Admiral Sir E. G. FANSHAWE, G.C.B.:—

The Resolution I have to propose is, “That the Report which has just been read should be adopted, printed and circulated amongst the Members.” The Chairman has so amply explained the points in the Report that I do not think it necessary, nor would it be desirable, that I should trespass upon the meeting except by emphasizing that particular part in which it is stated that it is essentially necessary for this Institution that more members should join. It appears to me so essential that I do not think the thing can go on unless we can get more Members to join. The number who have joined is really very small compared with the number of those who are eligible. Our Chairman said that he thought another six hundred Members were wanted; I should say at least another two thousand are wanted and ought to be got, and when we have these we shall only have sufficient to carry on the Institution in the rather, I might almost say, sparing way in which it has been necessary to carry it on owing to the necessity of saving money to build. I hope, therefore, we shall all do our utmost to induce the Members of the two Services to join the Institution.

Colonel BAYLIS, Q.C.:—

I have much pleasure in seconding this Resolution. I am aware of the responsibility that has always devolved upon the Volunteers to support this Institution, and to join it in as large numbers as possible; and I have always hoped, when it has been suggested that we should incur the expense of this building, that

the Volunteers would come forward nobly in every way to support the Institution. I am sure that we shall not want funds if they will come forward, either as Subscribers or as Annual Members. I think, Sir, to effect this object very much depends upon individual exertion. Speaking for myself I have done something towards getting Members to join, and I hope that all Members will collectively and individually do their very best to support the Institution.

Mr. RAITT :—

I rise, Sir, as the Senior Member of the Committee of Auditors, to say a few words upon this Resolution. The circumstances under which we meet are different from those under which we have met ever since I have been a Member of this Institution, and that is for more than forty years. I therefore think it desirable, before the voting on the Report takes place, that Members should understand the real position of the accounts. You will observe that the old form of accounts has been continued under circumstances which are totally different. You will see in the receipts money that has been received on account of the new building, also, on the other side, you have money expended on account of the new building. That makes it difficult for Members to ascertain the annual expenditure of the ordinary Institution. When my friend, Colonel Day, sent me a copy of the accounts, I immediately, by return of post, remonstrated against that account, because it did not show the true position in which we stand, and I suggested another account showing the receipts and expenditure on account of the new building entirely separate from the ordinary account. I say that the accounts as they stand are not satisfactory. I have made a rough extract which I will read to you. The ordinary receipts last year, omitting the amount for the new building, were £7,230, and the expenditure £4,550, leaving a balance of £2,680. The liabilities at the end of December, which belong to last year's accounts, were £255, leaving a balance to the good of the Institution of £2,426. But I must draw attention to this, that the expenditure includes money that should be devoted towards the purchase of funded property. Therefore, it is not altogether so promising as it would appear from the figures. Passing from that to the estimate of expenditure for the next year, we find there is an increased estimated expenditure of £1,224, beyond the ordinary expenditure of the recent year, and there is a loss of income calculated at £109 upon the sales of stock for the new building, and also there is a loss, I am sorry to say (and I hope the Navy will exert some influence to correct that loss if possible) of £169 on account of the Admiralty. That is the position of the accounts. I do not venture, at the present moment, to deal with the policy of expending in the ordinary way money out of capital, but I will proceed to paragraph 6, which is rather an important one. I think the Committee of Auditors have hardly been well treated over it. I received an intimation that my colleague, Colonel Wethered, has resigned. I am surprised he said nothing about it at the time of our Meeting, but he has resigned; and I was told it was the intention of the Council to appoint a chartered accountant. You, Sir, stated that the question had been well considered, but I really think that can hardly be the case, as by introducing a chartered accountant amongst the auditors you entirely change the character of the audit, and place the independent auditors in a very unpleasant position; and for that reason I can no longer continue to hold my appointment. I will draw attention to the fact that if you bring in a chartered accountant he will most likely—I think almost certainly from what I know, and I have had a good deal of experience in these things—introduce a series of changes, or want to do so, in the form of the accounts which we should not like. He will appeal to the Council, and the Council will be bound to support their paid man against the other two. That will reduce Mr. Drummond and myself practically to ciphers, and I am not going to allow myself to be put in that position. Therefore, immediately I received that intimation I wrote to Colonel Day, sending in my resignation. Not only is there, I think, a little want of consideration for the Committee of Auditors, who have audited the accounts for so many years, but I also think that that paragraph is rather a reflection upon them. It seems to me to imply that the Council have not confidence in them. I dare say the Council did not mean that, but it has that appearance, and of course I must protest against that. I say I think

the employment of a chartered accountant is a mistake. The signatures of chartered accountants goes merely for the accuracy of the figures, and I think the Council cannot have paid much attention to balance-sheets which have been published for the last few years, or they would not have suggested the employment of a chartered accountant. A balance-sheet was issued only on Wednesday last of one very important company referred to in the *Standard's* money article. They brought out a balance of £40,000 when the Company had actually lost £160,000, notwithstanding the certified balance sheet. I have been a director of a mercantile company for several years in which we have a chartered accountant, and we have two shareholders who are also auditors. The result was that we relied a good deal more upon the shareholder auditors than upon the chartered accountant, who was very willing to do everything pleasant to the people who employed him, while, on the other hand, the shareholder auditors looked to the interests of the shareholders. With regard to an Institution like this it seems to me that Members like myself have a great deal more interest to see that the accounts are right than men who are merely paid to come and look at them. In the Company I refer to the result was that we ultimately got rid of the chartered accountant, and have left it in the hands of the shareholders; and the balance-sheet we have issued is acknowledged to be one of the best balance-sheets in the City of London. I think the proper plan would be to get some one on the Council to act as Finance Minister, and then there would be no necessity for having a chartered accountant. The position of a shareholder or Member is much better than that of the chartered accountant, because he can go behind the accounts, whereas the chartered accountant cannot, but must accept what is placed before him. A Member can go behind the accounts and point out things which a chartered accountant could not. Therefore, although it is not my intention to act any longer as auditor, I believe it would be much better that some Members of the Institution should be appointed to audit the accounts instead of the adoption of this paragraph.

The CHAIRMAN:—

Before I call upon the next speaker, Colonel Hennell, I must say, on the part of the Council, they had not the slightest intention of reflecting upon the late Audit Committee; and I think I also implied, as far as I could, that the accounts next year will be put into a different form, which, I think, Mr. Raitt suggested.

Lieutenant-Colonel HENNELL, D.S.O.:—

In this Annual Report I am referred to as having sent in to a Special Committee a scheme which is called "A radical change in the terms of membership of the Institution." The Report adds: "The Committee are of opinion that it is not within their province to consider changes of the character advocated by Lieutenant-Colonel Hennell." This is the first intimation, except private letters from friends on the Council, that I have received as to my scheme. It was submitted two years ago, and for a year I heard nothing of it. The matter was then taken up by some friend, and placed before the Special Committee. When I read this notice it seemed to me as if it in a way implied that I advocated something so extraordinarily ridiculous as almost to be unworthy of consideration. ["No, no."] I am sure that could not have been the meaning on the part either of the Council or the Committee; at the same time I am bound to say it was my feeling, and it has been pointed out to me by others. For instance, within the last two or three days I have been asked, "What on earth is your scheme?" and I said, "Well, it is before the Council; they are considering it; I suppose there will be some steps taken." Then they said, "What is the meaning of this? It must mean it is something really that cannot be considered." Now, I say that this scheme was drawn up by me two years ago. I took a great deal of pains about it. I have been interested in this question for a great number of years. Everybody said that we wanted more subscribers. I tried to think out a scheme, and put it into form, and lay it before the Council. And having done so, for a year I heard nothing about it, but now I hear it has been gone into. I should like to receive from the President an assurance that this scheme is not so preposterous as you might be led to suppose.

Its object was to make the Institution a school for the young as well as a home for the old officers. After many years of advocacy, it has come to be a recognized thing in the Army, that all subscriptions in a regiment should be according to rank. My idea was, that this system might be followed with advantage for the benefit of this Institution. My scheme, briefly, was to have two scales, or divisions, of payments. One on joining the Services—Navy, Army, Militia or Volunteers—and the other on attaining field rank or its equivalent. It was simply dividing the present Life Subscription of £10 into two instalments of £5 each. I wished to appeal to all parents or guardians to pay the first £5 for the youngster on joining the Army or Navy. We all know that young fellows cannot afford to pay donations or subscriptions to anything outside their regiments; but I am sure we would not appeal in vain to those who have paid for their education, and sent them forth as sailors or soldiers to serve their country. This first half of £5 would make them Members of this grand Institution up to their attainment of field rank. They would then be in a position to pay the other half, the additional £5, to make them Life Members. May I now ask what Officer would resign such a position. He would be able to pay the money, and he would have learnt the real benefits of this great military school-house and museum, which certainly young fellows have little or no opportunity of doing.

Colonel YOUNG:—

Mr. Chairman and Gentlemen—I will at once go to the question of audit, because last year I had the pleasure of moving an Amendment to the proposed alteration of the Bye-laws, to the effect that we should cease employing our own Members to audit the accounts and that we should have a chartered accountant. I say with pleasure, because I came into the room without any seconder, and the Amendment was not only carried but carried by an overwhelming majority. I am here to-day to stand to the guns which I then levelled at the promoters of that Amendment of the Bye-laws, for I know of nothing to alter the views that I then had. They were briefly that the employment of a chartered accountant was an unnecessary extravagance and that the interests of the Institution were far more likely to be served efficiently by the employment of our own Members than by a chartered accountant. In that view I also had the honour of being supported by His Royal Highness, the President in the chair, who used words which I think ought to go home to everybody here, and were in effect, “If a thing is bad change it, but do not change it simply because it is old.” I think there is some confusion, perhaps, in the minds of the Council—I do not mean to say that in the slightest degree offensively—as to what is the security to be gained by the employment of a chartered accountant. A chartered accountant being a paid man will, when he has exhausted his energies according to what he considers is a profitable employment, cease to do anything further. But with regard to the security to be given to the Council, and what is more important, if I may say so, to the general body of the Members of this Institution, last year His Royal Highness referred to the Chairman of the Committee, and he asked the Chairman whether there was any reason to doubt that the audit had been well done in the past. The Chairman at once answered in the simplest manner that there was no reason to doubt it, and there is no reason to doubt it, and there will be no reason to doubt it; but he gave this further reason, that it would give confidence to the Members. Now I come entirely to dispute that. In the first place with regard to the expenditure. An auditor comes in when the expenditure is done and finished. He cannot give you the slightest security that the financial management which is represented by the expenditure will be any better or more secure. Whatever is paid is paid and done with. All that he can tell you is that it is perhaps irregular, or that it is fraudulent. In what respect will that be a greater security than that got at present? I think, Sir, we are going out of safe lines in distrusting our Members.

The CHAIRMAN:—

We do not distrust them.

Colonel YOUNG :—

I do not mean that you would distrust them, but you thought that it would give greater security. I think that there is a slight confusion as to what really the audit is, if I may say so ; and I do say this, that surely amongst the Members of a Service which has to do with the expenditure of something like thirty-three millions a year on the Army and Navy, there are men competent to do all that is necessary with regard to the audit of this Institution. I will not take up any further time, because there is in my view much more important matter in the Report which deserves the attention of this meeting, but I will stand to my guns and ask you to support me in this Amendment, and that is, that paragraph 6 of the Annual Report which provides that the accounts of the Institution be audited by chartered accountants instead of our Members and one member of our firm of Bankers, as hitherto, be not adopted.

General GORDON WATSON :—

I will second that Amendment. After the very thorough way in which Colonel Young has moved the Amendment I shall not take up the time of the meeting with more than a few words on my part. I must say I agree with him thoroughly in thinking that the audit of our accounts will be done much more satisfactorily to the majority of the Members of the Institution by our own Members than by the introduction of a paid accountant for the reasons given by Colonel Young. I have therefore much pleasure in seconding his Amendment.

Sir GEORGE CHUBB :—

I did not notice this particular paragraph until coming here, and I did not know that there was to be any discussion upon it ; but I should like to ask the Members of this Institution to pause before they carry this Amendment. I am sorry I cannot agree with what Mr. Raitt and my friend, Colonel Young, have said. I need only perhaps give one reason, although there are many, for thinking that this suggestion in the Report is a wise one. You are going to take shortly a very different position, you are going to appeal to a very large circle of outsiders, you are going to ask for many large sums and small sums from the public, who do not know who exactly are the Members of this Institution, or what is the working of it, and I cannot help thinking that they may look upon the accounts and the work of this Institution rather more favourably if they know that the audit and the inspection of accounts is in the hands of a chartered accountant, who is not in any sense responsible to the Members except for the accuracy of those accounts. The arguments that have been used, would, in my opinion, do away altogether with the use of a chartered accountant if they are carried out to their full extent, and as one engaged in business for many years, and who has reason to know the great value of accounts properly audited by suitable chartered accountants, I should look with grave doubt upon any alteration in the proposal of the Council of this Institution. I should strongly suggest that this proposal should be carried.

Vice-Admiral COLOMB :—

I should like to say that I should entirely agree with what Mr. Raitt and Colonel Young have said, if the accounts had remained in their old form, but I entirely agree with Sir George Chubb. It was the change which was coming, the appeal to the public, and the necessity of showing something to the public which we did not show before, which carried my vote in favour of paragraph 6. Had it not been for that, I should have voted against it.

Colonel PEARSON, 2nd Mid. Vol. Art. (E Div. R.A.) :—

I should like to be permitted to say one word on this question to support the action of the Council in the matter. If any arguments were required in reply to the speech of the gentleman who first spoke, and said that you must be satisfied with the form of account, I might say that we do not require so much an auditor

as we do a professional accountant to advise the Council as to the form of account. I will just mention, to be very brief, two points. If you take the general balance sheet, and look at the assets, you will find the amount expended upon building ought to be included there. £600 is not included. On the other hand the sum of £400, promised subscriptions, which are not in hand, and which are not an asset, are put down as an asset. I mention these two points as showing that these are things that really want revision. I think that if we have a professional adviser, perhaps not in the form of an auditor, it would enable you to present one account, showing clearly your liabilities and assets, and another account, showing your revenue as distinguished from mere cash receipts and payments for the year. I have much pleasure in seconding or supporting the recommendation of the Council.

Colonel LONSDALE HALE :—

I only wish, in one word, to justify the action of the Council in bringing forward again this year a motion which was decidedly rejected last year. Last year Colonel Malcolm Green got up and strongly opposed the change, and when this subject was mooted, with the altered conditions before us in this room, Colonel Green, the Chairman of the Finance Committee, was consulted as to the propriety of bringing this forward again. We are all prepared to pay very great respect to Colonel Green, and he has himself told us that he thought the change was wise, and that we were justified, under altered circumstances, in renewing the proposition. We asked Colonel Malcolm Green for his sanction, and we understood that it had been given.

Colonel MALCOLM GREEN, C.B. :—

As my name has been mentioned by Colonel Lonsdale Hale, I must offer a word of explanation. The fact is, up to the time of the last Annual Meeting, our accounts were of the simplest description, such as a child of 10 years of age could understand and make out. Since that time affairs have been very much changed. The form of accounts in the hands of the meeting is that adopted by the Statistical Society of London, and I thought we could not do better than follow their example. I do not, of course, pretend to oppose the first-rate opinions we have had from Colonel Wethered and other financial authorities, but I think we could not have done better than to substitute the form of the Statistical Society's accounts for that which we have been in the habit of previously issuing.

Colonel SPENCER GARDINER :—

I rise to a point of order. At the last General Meeting it was agreed that no change should be made in regard to the present system of auditing your accounts. This alteration seems to me to involve a change of the Bye-laws, of which due and proper notice has not been given. I therefore move that this paragraph be omitted from the Report as being out of order.

The CHAIRMAN :—

Perhaps Colonel Baylis will answer that question.

Colonel BAYLIS :—

I did not expect the objection to be raised, but, having been raised, I may say this, that I do not think the question has anything to do with the Bye-laws at all.

The CHAIRMAN :—

Before I put the Amendment, I should like to say that one of our auditors, Colonel Wethered, actually recommended that chartered accountants should be called in. I think that may have some weight with the Members.

Colonel YOUNG :—

May I reply to the objections to my Amendment?

The CHAIRMAN :—

I believe you can claim to do so, but I think it very inadvisable.

General the Right Hon. Lord CHELMSFORD, G.C.B. :—

Before Colonel Young rises, I should like to mention to the Meeting, that so dissatisfied was Colonel Young with the accounts that were rendered in this year's Annual Report, that he furnished another account, which, he considered, ought to have been adopted in their place. Therefore, it shows that Colonel Young, at all events, is not satisfied with the way in which the accounts were audited, otherwise he would not have recommended, as he has done, a completely new form of accounts. I believe Colonel Young's proposal is a very good one, but, at the same time, it shows that he has no confidence, at all events, in the way in which the audit is conducted.

Mr. RAITT :—

Lord Chelmsford has made a rather severe remark upon the auditors.

Lord CHELMSFORD :—

No, upon Colonel Young.

Mr. RAITT :—

It is not for the auditors to supply the form of account; it is for the Council to do that. All the auditors do, is to testify to their accuracy.

The CHAIRMAN :—

I have now to put the Amendment proposed by Colonel Young, and seconded by Colonel Gordon Watson, "that paragraph 6 be omitted."

Admiral Sir E. FANSHAWE :—

Might I ask, as a point of order, whether it comes within the Bye-laws?

Colonel BAYLIS :—

No.

Lord CHELMSFORD :—

Colonel Baylis stated that it was not a Bye-law.

The Amendment having been put from the Chair, was declared by the Chairman to be lost by a large majority.

General Sir ARTHUR HERBERT, K.C.B. :—

May I draw attention to an Amendment "that Paragraph 8, relating to the changes in the staff of the Institution, be not adopted until such time as the finances of the Institution permit the proposal to be carried out without annually dipping into capital." I can assure you, gentlemen, that it is not with the slightest hostility, or any wish to go against the Council, that I make this proposal, but really, I think it is a very inopportune time to make the change. If you look at the accounts, you will find capital and income are so mixed up, as we have been told, that there may be a difference of opinion upon what is the annual income of the Institution. There can be no doubt that the estimated receipts are, from Annual Subscriptions, £3,100; from Sales of Journals, £275; from Lending Library, £40; and from Advertisements in the Journal, £45. The Cash Balance and Entrance Fees certainly would belong to capital. But as to Annual Subscriptions there may be a doubt, about Life Subscriptions there may be a doubt; I think they ought not to be carried to Capital Account, but to Receipts. The fact is, you have a deficiency now of about £843 a year on the expenses—annual expenses against annual receipts. Now we are adding to that £300 a-year, which,

I do not think, we can possibly avoid, but, is it advisable to do so when there is so much on the wrong side. However, that is a matter you have to decide. Might I also call your attention to an economy, which, I think, might be made with advantage. The postage for the Journal is £360 a-year. Could not some arrangement be made by which that could be paid by the Members, and thus save £300 a-year to the Institution. If we saved £300 a-year by that, and £300 a-year by continuing the present state of things, it would be a great gain to us, I am quite sure that Colonel Lonsdale Hale, who has conducted the Journal hitherto with such great ability, would consent, for a time—merely for a time, to continue in his office, and not ask to increase the expenses when they are already so much to the bad.

The CHAIRMAN:—

I am sure that any remarks from Sir Arthur Herbert must merit great consideration, but surely he cannot wish us to go back. We have elected a new Secretary, and a new Auditor, and surely we cannot contradict ourselves. My feeling is this, that we need not be afraid of *£. s. d.* My private opinion, rather publicly expressed, is that, if we get into financial difficulties, which I do not anticipate, the Government must assist us, I do not care who the Chancellor of the Exchequer may be. We have made a bold venture; we have taken a building; and money must be forthcoming.

Colonel YOUNG:—

I wish to offer a few observations, and I think the character of military men for fairness will secure me a hearing. At the last Annual Meeting, I ventured to suggest a way which would have prevented the increase which has been caused by changes in our staff. Therefore, I am not a critic after the event. I rose and stated that I wished to offer some observations which might cause the Council to pause before they took this step, but I was ruled out of order, and I bowed to the ruling, but to-day, when we are asked to adopt this Report and plunge ourselves into deeper financial difficulties than we appear to be able, from the Council's own estimate of the future, to meet, I do say it is time for Members to cry "Halt" to the present state of affairs. A year ago our position was one of comfortable security, our policy was one of conservative finance, and we cut our garment according to our cloth.

The CHAIRMAN:—

That is all disposed of.

Colonel YOUNG:—

I beg your pardon; I am prepared to move an Amendment.

The CHAIRMAN:—

We have decided to build; we have made the plunge; surely it is the duty of everybody present to support us, right or wrong.

Colonel YOUNG:—

Undoubtedly it is the duty, and I was one of those who voted for the plunge, but I guarded myself in so doing by saying that it was with prudence that we should do it, but it was hardly prudent when we went and allocated the whole of our capital for building purposes, and pledged ourselves to get £800 a-year in addition, to add £300 a-year on to that, when, in that £300 a-year is involved the pension of our most worthy Secretary. I have looked to see what the powers of this Institution are in its Charter, and a gentleman of authority in these matters, a Queen's Counsel, told me that we were in a position of great danger. The Charter says, that we have no power to take any building or hall, or any tenement or land, which exceeds in rack-rental £2,000. Now, our new site by the rating, and we have the figures from our accountant, is put down at £2,960, and this gentleman, who gave me a friendly opinion, said it was quite worth the while of the Council to go to the Government, and ask the opinion of the Law Officers of the Crown as

to whether the Charter had not been violated. It is to the Government that we must look for help, and if you can prove to them that they have participated in an error, which has led us, unwittingly, into breaking the Charter, we must call upon them to help us out of the difficulty.

The CHAIRMAN :—

We anticipated this point being raised, and, if you will bear with me, I will read to you the opinion of the solicitors. "We have carefully considered the Charter of Incorporation. In our opinion the occupation of the Banqueting House by your Institution under the terms given by Her Majesty is not a holding of premises within the meaning of the Charter, and that the rack-rental of £2,000 a year may be considered as applying only to the new buildings and the site thereof." I think that is an answer to Colonel Young. I therefore venture again to put the motion "That the Report now read be adopted and printed for circulation among the Members."

The Resolution having been put from the Chair was declared by the Chairman to be unanimously adopted.

General ERSKINE :—

The Resolution which has been placed in my hands is as follows: "That the thanks of this Meeting be given to the auditors, Lieutenant-Colonel Wethered, E. R. Raitt, Esq., and A. H. Drummond, Esq., for their valuable services, and that the following gentlemen be elected for the ensuing year, viz., Major Parkinson, Army Pay Department, A. H. Drummond, Esq., and the firm of Messrs. Wilde and Venables, Chartered Accountants." I may say in regard to that firm that Colonel Wilde is a Member of this Institution. He is a Life Member and has been connected with the Institution for many years. I have no doubt he will do everything in his power to forward this Institution.

Vice-Admiral LINDESAY BRINE :—

I beg to second the motion.

The motion having been put from the Chair was declared by the Chairman to be carried unanimously.

Colonel WILDE :—

I am much obliged to the Members for having elected my firm as special auditors, and I can assure them that we shall take a very special interest in looking after the accounts of the Association.

The SECRETARY then read the report of the Referees (Military Prize Essay), which stated that the gold medal was awarded to Lieutenant-Colonel John Farquharson, C.B., hp., Royal Engineers, whilst essays by Major J. Adye, R.A., Major H. W. Pearse, East Surrey Regiment, and Colonel Duncan, Assistant Quartermaster at Headquarters, were honourably mentioned.

Admiral The Right Hon. Sir J. DALRYMPLE HAY, Bart., K.C.B. :—

I am desired to move a vote of thanks to the Referees. We know the laborious duty undertaken by our colleagues in this matter. I am sure we all recognise the impartiality, admirable knowledge, and sound judgment of General Sir George Chesney, Lieutenant-General E. F. Chapman, and Lieutenant-Colonel N. L. Walford. I therefore move that a vote of thanks be given to the Referees for the arduous duties that they have undertaken.

Captain Sir ALFRED JEPHSON, R.N. :—

I beg to second the motion.

The motion having been put from the Chair was declared by the Chairman to be carried unanimously.

The CHAIRMAN :—

Before I call upon Colonel Lonsdale Hale to move his motion, I may just say, as perchance some of you have not carefully read the Report, with regard to the question he is about to bring forward, that it was an accidental omission that the list of Naval Members was not filled up. If this motion is not carried you will have no Naval Members elected this year, and, although I am a Naval Officer myself, I think that is to be regretted. I therefore now call upon Colonel Lonsdale Hale.

Colonel LONSDALE HALE :—

It is not only as the Chairman has said that if you do not carry a motion to this effect, we shall have no Naval Members this year, but we shall also have to break a bye-law. That is the fix we are put into. How it has arisen I do not know, or why there were no Naval Members nominated. The first bye-law says your Council is to be composed of 24 Members, and we must evade that bye-law somehow to get the 24 Members. A further paragraph says that at the Annual General Meeting lists giving the names of naval and military nominees respectively, and showing the number of vacancies to be filled up from each Service will be handed by Members present at the Meeting, marked by them, to the scrutineers. It absolutely forbids us having Military Members to fill up Naval vacancies, so that if you do that we shall break another bye-law, and we are in a regular dilemma. Therefore I move, in order to meet this difficulty in the first place, that we “add to Paragraph 1, Section IV, Government, the words ‘The proportion of Naval to Military Members being approximately 2 to 3.’” That was a clerical error on my part, and I hope you will allow it to be altered to 1 to 2. One to two is the proper proportion, not 2 to 3. Then, with regard to the next, I propose “Paragraph 4, between Clauses 8 and 9, to insert the following additional clause, viz., ‘If at any time there are no elected nominees to fill a vacancy or vacancies occurring in the Council, the election to the vacancy or vacancies shall devolve on the Council.’” That will not only enable us to obtain Members for the Council, if there was no list at such election, but in the case of the outbreak of war, or where our active Members had to leave the Council, and perhaps the elected nominees might have to leave too, the Council could fill up the vacancies. There have been always so many declamations against anything like a close borough election, that I did not make any provision in case of failure in nominees. I think Field-Marshal Sir Lintorn Simmons is about to do me the honour of seconding this. I may add that General Erskine, also a Member of the Council, will put the same thing before you in rather a different shape, and if the Field-Marshal will agree, I shall be very happy to give way to the proposal that the General brings forward. I propose, in the first instance, “To add to Paragraph 1, Section IV, Government, the words, ‘The proportion of Naval to Military Members being 1 to 2.’” There are now 8 Naval Members and 16 Military. I think there will be no dispute about that proposition.

Field-Marshal Sir J. LINTORN SIMMONS, G.C.B., G.C.M.G. :—

I quite agree with that alteration, 1 to 2, and I second that portion of the Resolution. I should like, however, to make a few observations with regard to what has fallen from Colonel Lonsdale Hale, as to this system introduced by the bye-laws last year. There is a book laid upon the table in this Institution, in which members may, up to the 30th of January, write in any names they like to bring forward at the General Meeting for membership of the Council. That book, no doubt, is open in the Institution, but people have forgotten it, and there was nothing to call attention to it. Therefore, it was most natural that people should not look after it. For my own part, I knew nothing at all of the book being open to the 30th of January, or I might perhaps have inserted the names of several among the Military Members, but the Naval Members individually were not aware of it like myself, and I believe like almost everyone of the Council except Colonel Hale, and so the book was not filled up. That is the unfortunate position, and I

must say I could not think of anything more disastrous for the Institution starting in its new place on which we are entering than that we should not have our full proportion of Naval Members. I earnestly support this Resolution. I believe the form will be altered by a proposal of General Erskine, which will carry the same effect, and therefore, in speaking to this, I am speaking to what I believe will be his alteration, and I think we cannot do better than adopt the Resolution in whatever form it is presented to you, which will enable us to have the full number of Naval Members on the Council.

The CHAIRMAN :—

Then I will put the first part of the motion. It is a change of law, so that it requires a majority of two-thirds, and I hope we shall see everybody's hand up. The Resolution is "To add to paragraph 1, Section IV., Government, the words: 'The proportion of Naval to Military Members being approximately 1 to 2.'"

The Resolution having been put from the Chair, was declared by the Chairman to be unanimously adopted.

The CHAIRMAN :—

The next paragraph is "Paragraph 4, between Clauses 8 and 9, to insert the following additional clause, viz., 'If at any time there are no elected nominees to fill a vacancy, or vacancies, occurring in the Council, the election to the vacancy or vacancies shall devolve on the Council.'"

General ERSKINE :—

I will move my Amendment to this paragraph as briefly as I can. I venture to think that there should be two additional clauses instead of one to carry out what we have in view. It appears to me the Resolution, as it now stands, is a violation of the fundamental principle of our Charter. If you look to the Charter you will observe that the original election to the Council was ordered to be by the General Meeting, and that principle has been carried out ever since the Charter was given to this Institution through the bye-laws. Our existing bye-law says the election shall be carried out by the Members present at the Annual Meeting, and therefore the change which I propose is this, that we have two additional clauses, the first of which would run thus:—"If, when closing on 1st February the Book of Nominations for election to the Council, it is found that there is not a sufficient number of eligible nominees to provide for filling vacancies in the Council during the coming year, it shall be the duty of the Council to supply the requisite number of nominees for submission to the Annual General Meeting." If that clause is approved by the General Meeting that will set us right, and as you said, on bringing forward this matter, voting papers would be distributed amongst the General Meeting at the present time, and the election then of Naval Members would go on *pari passu* with the election of the Military Members. But we come now to the case to which Colonel Hale alluded to when he spoke on this subject, and that is to provide for the occurrence of vacancies in the Council during the interval between one Annual General Meeting and another. Hitherto that has always been done on the authority of the Council, but we think it is better that that proceeding should have the sanction of a bye-law, and the bye-law would be altered in this way:—"If, during the interval between one Annual General Meeting and another, there are no non-elected nominees,"—it should be "non-elected nominees." Of course an elected nominee becomes a Member, but it is from the list of nominees that have not been elected;—"no non-elected nominees to fill a vacancy or vacancies occurring in the Council, the election to the vacancy or vacancies shall devolve on the Council." I do not know that I need detain you by any further observations.

The CHAIRMAN :—

Will you second the Amendment?

Field-Marshal Sir LINTORN SIMMONS :—

I am quite ready, with Colonel Hale's consent, to accept the Amendment as proposed by General Erskine.

Commander SULLIVAN :—

Does not this involve an alteration in the Bye-laws ?

General ERSKINE :—

This is an Amendment upon a proposition which has been hung up for the last fortnight ; therefore it is in order.

Commander SULLIVAN :—

I have no objection to make to it, but it does not seem clear how the thing would work ; for instance, if the military men have a great many more people put down for the places than are required : but it is quite possible that if there are four vacancies there may be only two or three men with crosses put against them.

The CHAIRMAN :—

Quite independent.

Commander SULLIVAN :—

What will happen about the remainder.

The CHAIRMAN :—

They will come on as vacancies occur during the year.

Field-Marshal Sir LINTORN SIMMONS :—

The previous Resolution will fix the proportion.

The Amendment was then put from the Chair and was carried.

It was also put as a substantive motion and agreed to :—

“ If, when closing, on February 1st, the Book of Nomination for election to the Council, it is found that there is not a sufficient number of eligible nominees to provide for filling vacancies in the Council during the coming year, it shall be the duty of the Council to supply the requisite number of nominees for submission to the Annual General Meeting.

“ If, during the interval between one Annual General Meeting and another there are no non-elected nominees to fill a vacancy or vacancies occurring in the Council, the election to the vacancy or vacancies shall devolve on the Council.”

Sir George CHUBB :—

I have to move—“ That the thanks of the meeting be given to the Members of the Council, who, having served three years thereon, now retire, viz. : Vice-Admiral P. H. Colomb ; Admiral Sir W. Houston Stewart, G. C. B. ; Lieut.-General E. H. Clive, Governor and Commandant Royal Military College ; Major-General R. N. Dawson-Scott, Commandant School of Military Engineering, Chatham ; Lieut.-Colonel N. L. Walford, R.A., Assistant Director of Artillery, War Office ; and that the military officers be balloted for in accordance with Section IV, Par. 4, of the Bye-laws.”

Rear-Admiral CLEVELAND :—

I second that, and I do so not merely formally, because I know how heartily they deserve our thanks.

The motion was then put from the Chair, and carried unanimously.

Lieut.-General GOODENOUGH, C.B. :—

Will you allow me to offer one word of personal explanation ? With reference to Colonel Hennell's remarks a little while ago, I think he was a little aggrieved, and we should do well here to conciliate rather than offend in any way any of our Members. The point he wanted to elicit was, I think, quite inadvertently not

brought out, although the Chairman answered him. It was this. The fact is, that in the appendix to the Report before you you will find the declaration of the Special Committee was that it was *ultra vires* on their part to deal with Colonel Hennell's recommendation. It did not mean to declare positively that his recommendation had been considered and condemned, but that it was *ultra vires* of that Special Committee to consider it; therefore, perhaps in an amended form, at some future day, he might bring forward something of the kind again. We wanted that to be put on record.

The CHAIRMAN :—

I am sure we all agree with the remarks made by General Goodenough. I think we have made a great mistake to-day in not recognising the services of Col. Lonsdale Hale (cheers).

Colonel GUNTER :—

I beg to move—"That the thanks of this meeting are due to Col. Lonsdale Hale for the great ability and industry with which he has edited the Foreign Section of the Journal for the last sixteen years." An acknowledgment has been made in the most substantial manner of the services of his coadjutor, Captain Burgess, and I think we certainly should not be acting rightly if we did not acknowledge such valuable services as Colonel Hale has rendered us.

General Sir A. HERBERT :—

I will second that.

The motion was put from the Chair and carried unanimously.

Lord CHELMSFORD :—

I move—"That a hearty vote of thanks be given to Admiral Sir George Willes for his services in the Chair this day."

The motion was carried by acclamation.

The ballot was then taken for the election of Members of Council, with the following result :—

NAVAL.

Major EDYE, R.M.L.I., Naval Intelligence Department.
Rear-Admiral CLEVELAND, Vice-President Ordnance Committee.
Rear-Admiral LONG.

MILITARY.

Lieut.-Colonel N. L. WALFORD, R.A.
Major The EARL OF AIRLIE, 10th Royal Hussars, Adjutant Hants Yeomanry.
Colonel S. G. BIRD, Commanding 1st Middlesex Rifle Volunteers.
Lieut.-Colonel AULD, D.A.A.G., Aldershot.

PUBLICATIONS PURCHASED AND EXCHANGED DURING 1892.

ALMANACS, GUIDES, &c.—

A B C RAILWAY GUIDE.
 ALDERSHOT MONTHLY DIRECTORY.
 ARMY AND NAVY CALENDAR.
 BOYLE'S COURT GUIDE.
 BRADSHAW'S MONTHLY RAILWAY GUIDE.
 BRITISH ALMANACK AND COMPANION.
 BRITISH POSTAL GUIDE.
 BURKE'S PEERAGE.
 CLERGY LIST.
 DE GOTHA ALMANACK.
 HAZELL'S ANNUAL.
 INCORPORATED LAW CALENDAR.
 KELLY'S POST OFFICE GUIDE.
 MEDICAL DIRECTORY.
 NAUTICAL ALMANACK.
 OLIVER AND BOYD'S EDINBURGH ALMANACK.
 ROYAL BLUE BOOK.
 SERVICE ALMANACK.
 WHITAKER'S ALMANACK.
 WOOLWICH MONTHLY DIRECTORY.

INSTITUTIONS AND SOCIETIES.

ALDERSHOT MILITARY SOCIETY.
 ANTHROPOLOGICAL INSTITUTE.
 ANTIQUARIES, SOCIETY OF.
 BRITISH ASSOCIATION.
 CIVIL ENGINEERS, INSTITUTION OF.
 EAST INDIAN ASSOCIATION.
 ELECTRICAL ENGINEERS, INSTITUTION OF.
 IRON AND STEEL INSTITUTE.
 JUNIOR ENGINEERING SOCIETY.
 MANCHESTER, LITERARY AND PHILOSOPHICAL SOCIETY OF.
 MANCHESTER TACTICAL SOCIETY.
 MECHANICAL ENGINEERS, INSTITUTION OF.
 NATIONAL SOCIETY FOR AID TO SICK AND WOUNDED.
 NATIONAL RIFLE ASSOCIATION.
 NAVAL ARCHITECTS, INSTITUTION OF.
 NORTH OF ENGLAND MINING AND MECHANICAL ENGINEERS.
 ROYAL AGRICULTURAL SOCIETY.
 ROYAL ARCHÆOLOGICAL INSTITUTE.
 ROYAL ARTILLERY INSTITUTION.
 ROYAL ASIATIC SOCIETY, Bengal Branch.
 ROYAL ASIATIC SOCIETY, Bombay Branch.
 ROYAL ASTRONOMICAL SOCIETY.
 ROYAL COLONIAL INSTITUTE.
 ROYAL ENGINEERS' INSTITUTE.

INSTITUTIONS, &c.—(contd.).

ROYAL GEOGRAPHICAL SOCIETY.
 ROYAL HUMANE SOCIETY.
 ROYAL INSTITUTION.
 ROYAL NATIONAL LIFE-BOAT INSTITUTION.
 ROYAL STATISTICAL SOCIETY.
 ROYAL SOCIETY OF EDINBURGH.
 ROYAL SOCIETY OF GREAT BRITAIN.
 SANITARY INSTITUTE OF GREAT BRITAIN.
 SHIPWRECKED FISHERMEN AND MARINERS' SOCIETY.
 SOCIETY OF ARTS, &c.
 UNITED SERVICE INSTITUTION OF INDIA.
 VICTORIA INSTITUTE, LONDON.
 ZOOLOGICAL SOCIETY JOURNAL.
 „ „ TRANSACTIONS OF.

PERIODICALS.

Daily—

DAILY NEWS.
 DAILY TELEGRAPH.
 GLOBE.
 MORNING POST.
 ST. JAMES'S GAZETTE.
 STANDARD.
 TIMES.

Weekly—

ADMIRALTY AND HORSE GUARDS GAZETTE.
 HOMEWARD MAIL.
 ARMY AND NAVY GAZETTE.
 ATHENÆUM.
 BROAD ARROW AND NAVAL AND MILITARY GAZETTE.
 COLONIES AND INDIA.
 ENGINEER, THE.
 ENGINEERING.
 INVENTION.
 IRON.
 LANCET, THE.
 NATURE.
 NAVAL AND MILITARY RECORD AND DOCKYARDS GAZETTE.
 NOTES AND QUERIES.
 SATURDAY REVIEW.
 UNITED SERVICE GAZETTE.
 VOLUNTEER SERVICE GAZETTE.

Monthly—

JACKSON'S WOOLWICH JOURNAL.
 KNOWLEDGE.
 METEOROLOGICAL OFFICE, PUBLICATIONS.
 NAUTICAL MAGAZINE.

PERIODICALS—(contd.).

PHILOSOPHICAL MAGAZINE, LOND.,
EDIN., DUBLIN.

SHIPPING WORLD.

UNITED SERVICE MAGAZINE.

VOLUNTEER SERVICE MAGAZINE.

WESTMINSTER REVIEW.

Quarterly—

ASIATIC REVIEW.

EDINBURGH REVIEW.

QUARTERLY REVIEW.

NAVAL AND MILITARY LISTS—

ARMY LIST, MONTHLY.

” OFFICIAL, QUARTERLY.

ARMY LIST, HART'S ANNUAL.

NAVY LIST, MONTHLY.

NAVAL AND MILITARY LISTS—(contd.).

NAVY LIST, ROYAL QUARTERLY.

ARTILLERY LIST, ROYAL MONTHLY.

” ” ” QUARTERLY.

ENGINEERS' LIST, ROYAL MONTHLY.

MISCELLANEOUS—

ANNUAL REGISTER.

DEPARTMENT OF DIRECTOR OF MILITARY EDUCATION, EXTRACTS OF PROCEEDINGS OF.

ORDNANCE COMMITTEE, EXTRACTS FROM THE ANNUAL REPORT OF THE PRESIDENT.

PROFESSIONAL PAPERS, ROYAL ENGINEERS, S.M.E., CHATHAM.

STATESMAN'S YEAR-BOOK.

FOREIGN AND COLONIAL.

AMERICA, U.S.A.

AMERICAN SOCIETY, CIVIL ENGINEERS.

ARMY AND NAVY JOURNAL.

BUREAU OF ETHNOLOGY, ANNUAL REPORT OF.

NOTES ON THE CONSTRUCTION OF ORD-
NANCE.

ORDNANCE NOTES.

SCIENTIFIC AMERICAN.

SMITHSONIAN INSTITUTE, ANNUAL REPORT OF.

UNITED STATES ARTILLERY JOURNAL.

UNITED STATES CAVALRY ASSOCIATION.

UNITED STATES GEOLOGICAL SURVEY, REPORTS.

UNITED STATES MILITARY SERVICE INSTITUTE JOURNAL.

UNITED STATES NAVAL INSTITUTE JOURNAL.

UNITED STATES UNITED SERVICE MAGAZINE, THE.

AUSTRIA.

MITTHEILUNGEN AUS DEM GEBIETE DES SEE-WESENS.

MITTHEILUNGEN ÜBER GEGENSTÄNDE DES ARTILLERIE- UND GENIE-WESENS.

ORGAN DER MILITÄR-WISSENSCHAFT-
LICHEN VEREINE.

AUSTRALIA.

ROYAL SOCIETY OF NEW SOUTH WALES, JOURNAL.

UNITED SERVICE INSTITUTION OF NEW SOUTH WALES, JOURNAL.

UNITED SERVICE INSTITUTION OF VICTORIA, JOURNAL.

CANADA.

CANADIAN SOCIETY OF CIVIL ENGINEERS, PROCEEDINGS OF.

CANADIAN MILITARY INSTITUTE, TRANSACTIONS.

GEOLOGICAL AND NATURAL HISTORY SURVEY, REPORT OF.

QUEBEC LITERARY AND HISTORICAL SOCIETY, PROCEEDINGS OF.

ROYAL SOCIETY OF CANADA, PROCEEDINGS OF.

FRANCE.

ANNUAIRE DE LA MARINE.

ANNUAIRE DE L'ARMÉE FRANÇAISE.

JOURNAL DES SCIENCES MILITAIRES.

L'AVENIR MILITAIRE.

LE SPECTATEUR MILITAIRE.

LE YACHT.

REVUE D'ARTILLERIE.

” DE CAVALERIE.

” DES DEUX MONDES.

” DU CERCLE MILITAIRE.

” MARITIME ET COLONIALE.

” MILITAIRE DE L'ÉTRANGER.

” DU GÉNIE MILITAIRE.

” DU SERVICE DE L'INTENDANCE MILITAIRE.

GERMANY.

ARCHIV FÜR DIE ARTILLERIE- UND INGENIEUR-OFFIZIERE DES DEUTSCHEN REICHSHEERES.

JAHRBÜCHER FÜR DIE DEUTSCHE ARMEE UND MARINE.

JAHRBERICHTE ÜBER DIE VERÄNDERUNGEN UND FORTSCHRITTE IM MILITÄRWESEN.

MILITÄR LITERATUR-ZEITUNG.

” WOCHENBLATT.

NEUE MILITÄRISCHE BLÄTTER.

ITALY.

RIVISTA MARITTIMA.

” MILITARE ITALIANA.

” DI ARTIGLIERIA E GENIO.

JAPAN.

SEISMOLOGICAL SOCIETY TRANSACTIONS.

RUSSIA.

MILITARY SCIENCE AND LITERATURE,
MAGAZINE.

DITTO NAVAL.
ARTILLERY JOURNAL.
ENGINEER JOURNAL.
MILITARY JOURNAL.

SPAIN.

REVISTA GENERAL DE MARINA.
MEMORIAL DE INGENIEROS DEL EJÉRCITO.

REVISTA TÉCNICA DE INFANTERIA Y
CABALLERIA.

SWEDEN.

KONGL. KRIGSVETENSKAPS - AKADEMIENS
HANDLINGAR OCH TIDSKRIFT.

SWITZERLAND.

REVUE MILITAIRE SUISSE.

MAPS, PLANS, CHARTS, &c.

Purchased and Presented during 1892.

Pilot Chart of the North Atlantic Ocean,
1892. Monthly sheets.

*By the U.S. Naval Depart.,
Washington.*

Topographical Atlas of Switzerland
(*in continuation*).

By the Swiss Govt.

Topographical Atlas of Denmark
(*in continuation*).

By the Danish Govt.

Dislocations. Karte der Indo-britischen
Streitkräfte in Ost-Indien und der
russischen Streitkräfte in Asien, 1892.

Map of the Malay Peninsula, 1891.
86 sheets 1" Ordnance Survey, England
(*in continuation*).

The Basins of the Rhine and Danube.

Charts, Sailing Directions, Pilots, &c.,
issued by the Hydrographer, 1892.

*By the Lords Commissioners
of the Admiralty.*

Lithographs, issued by the Royal Ar-
senal, 1892.

By the Sec. of State for War.

Map of the Environs of Morocco City.

Plan of the City of Tangier.

Zambesi, sheet II.

Map of Persia, 6 sheets.

General Map of Eastern Equatorial
Africa, 1892.

General Map, S.E. Africa.

Anglo-French Boundary, Sierra Leone,
8 sheets.

General Map, Pacific Islands, 1891.

By the Intel. Divn., W.O.

MUSEUM.

Presented, 1892.

Two glazed Cases of Grasses. (Prepared
for the information and guidance of
Officers who may have to inspect
Forage.)

By Messrs. Sutton & Sons, Reading.

Two Packets Remington Ammunition,
picked up at Tel-el-Kebir.

By Major Clarke, C.M.G., R.E.

Specimens of Smokeless Powder.

„ Rifle Powder.

„ Sporting Powder.

„ Rook Powder.

„ Rifleite Powder.

By the Smokeless Powder Company.

Two Foreign Orders, conferred on the
late Major J. H. Lawrence-Archer,
60th Rifles. *Bequeathed by him.*

Two Maps, drawn by a Burmese.

Burmese "Crowsfeet."

An Afghan Imitation of a "Wood Time
Fuze," picked up at Kandahar, 1880.

*By Captain R. J. Scallon, D.S.O.
23rd Bombay Infantry.*

Bronze Medal, Isaac Newton.

By Colonel Woodward, late R.E.

German Rifle, 1888.

Mausier Repeating Rifle, 1891.

Dummy Cartridges.

By Loewe & Co., Engineers, Berlin.

A Coat of Mail, from the Punjab.

A Sword and Scabbard, from the Punjab.

*By F. C. Boughey Burgess, Esq.,
M.I.M.E.*

A Set of Camel Harness.

Pontoon Model, &c.

*By Major Copeman, 3rd V.B.,
Norfolk Regt.*

Glass Case, containing a Russian Bugle
and two Naval Officers' Epaulettes,
picked up after the taking of the
Redan, 18th June, 1855.

By Captain Spencer Beaumont.

Medallion of the late Captain W. H. Dick-
son, R.N. *By H. E. Dickson, Esq.*

Badges of the 57th and 77th Regiments,
*By Major J. Grove White,
Middlesex Regt.*

The Additions (Books) to the Library will be issued yearly in the form of the Library Catalogue.

PARLIAMENTARY PAPERS RECEIVED DURING 1892.

- [C-6582.] Report of Committee to consider the Terms and Conditions of Service in the Army, with Appendices, Digest, and Index.
 [C-6596.] Memorandum of the Secretary of State relating to the Army Estimates for 1892-93.
 [C-6597.] Annual Report of the Inspector-General of Recruiting for 1891.
 [C-6598.] Yeomanry Cavalry Training Return, 1891.
 [C-6599.] Establishment of each Regiment of Militia in the United Kingdom, 1891.
 [C-6624.] Annual Return, Volunteer Corps, 1891.
 [C-6675.] Report on the Condition of the Yeomanry.
 [C-6688.] Report of the Committee on Colour Vision.
 [C-6722.] General Annual Return, British Army, 1891.
 [C-6723.] Report, Military Prisons, 1891.
 [C-6792.] 30th Report, Patriotic Fund.
 [C-6838.] Report, Number and Quality, Recruits, 1892.
 [C-6422.] Census of England.
 [C-6390.] Ditto Scotland.
 [C-6755.] Ditto Ditto.
 [C-6515.] Ditto Ireland.
 [C-6567.] Ditto Ditto.
 [C-6626.] Ditto Ditto.
 [C-6685.] Ditto Ditto.
 [C-6780.] Ditto Ditto.
 [C-6782.] Ditto Ditto.

17. Chelsea Hospital, Account, 1890-91.
 18. Imperial Defence Act, Ports and Coaling Stations, Account, 1890-91.
 37. Army (Courts-Martial) Return, 1890.
 24. Barrack Act, 1890, Account, 1890-91.
 40. Army Appropriation, Account, 1890-91.
 41. Army (Ordnance Factories) Appropriation Account, 1890-91.
 76. Army Estimates, 1892-93.
 77. Ordnance Factories Estimate, 1892-93.
 81. Navy Estimates, 1892-93.
 113. Royal Army Clothing Factory, Account, 1890-91.
 129. Ordnance Factories, Account, 1890-91.
 142. Army Guns (Rifled Iron and Steel) Return.
 149. Army (Terms and Conditions of Service).
 154. Army and Navy Expenditure, 1892-93.
 155. Army and Navy Expenditure, 1891-92.
 189. Government Contracts (Wages).
 247. New Forest Rifle Range.
 259. Report, Military Lands Consolidation Bill.
 275. Army (Military Savings' Banks).

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